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In childhood and in the earliest period of education have more care for the health of the body than for the mind, and for the moral character than for the intellectual. Let nothing base or servile, vulgar or disgraceful, meet the eye or assail the ear of the young; for from words to actions is but a step. Let their earliest and first impressions of all things be the best. Let them be taught fully all the essential elements of education and as much of what is useful in a merely mechanical point of view as will have the effect of rendering the body, the soul, and the intellectual powers capable of arriving at the highest excellence of their respective natures. The merely useful, or absolutely necessary matters of education are not the only ones that deserve attention, but to these should be added such as exalt and expand the mind and convey a sense of what is beautiful and noble. For to be looking everywhere to the merely useful, is little fitted to form an elevated character, or a liberal mind.—*Aristotle.*

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UNIVERSITY OF ILLINOIS.

The University of Illinois has its seat in Champaign county, in the eastern central part of the state, between the twin cities of Champaign and Urbana, within the corporate limits of the latter. It is one hundred and twenty-eight miles southward from Chicago, at the junction of the Illinois Central, the Cleveland, Cincinnati, Chicago and St. Louis, and the Wabash railways. The situation is a beautiful one and the "art that doth mend nature" has added rare charms to the grounds and surroundings. The country around is one of the richest and most prosperous agricultural regions of the world, and the local municipalities, with a combined population of 11,000, are noted for public spirit and high moral tone.

HISTORY.

Unlike most of the states admitted into the Union after its formation, Illinois had no state university during the early years of its history. The attempts made from time to time to found one were not successful in the legislature. But at length a number of public spirited citizens, conspicuous among whom was Professor J. B. Turner, of Jacksonville, vigorously agitated the question and earnestly advocated the establishment by the state of an institution in which instruction might be given "upon all those studies and sciences of whatever sort which tend to throw light upon any art or employment which any student may desire to master, or upon any duty which he may be called to perform, or which may tend to secure his moral, civil, social and industrial perfection as a man." These ideas were embodied in a bill introduced in the General Assembly in 1855, but owing to the late position on the calendar the bill failed to become a law.

In the meantime the same parties in Illinois, uniting with others in different parts of the country, made strenuous efforts to secure aid from the national government. These efforts culminated in 1862 in an act giving to each state public land scrip apportioned in quantity equal to 30,000 acres for each senator and representative in congress, "for the endowment, support and maintenance of at least one college, whose

leading object shall be, without excluding other scientific and classical studies, and including military tactics, to teach such branches of learning as are related to agriculture and the mechanic arts, * * * * * in order to promote the liberal and practical education of the industrial classes in the several pursuits and professions of life."

Under this act Illinois received scrip for 480,000 acres of land subject to location in any surveyed but unoccupied part of the public domain. At this time the market value of the scrip was very low, and great difficulties seemed to present themselves in locating land upon it. But 25,000 acres were thus located in Nebraska and Minnesota, while the remainder of the scrip was sold for what could be obtained. In compensation for waiting something more than a quarter of a century, the land thus secured has added and will add to the endowment fund nearly as much as was obtained for the vastly greater proportion of the scrip originally sold. The entire principal sum received from the sale of scrip and of land is held inviolate as endowment, the income only being available for current expenditures.

To secure the location of the University several counties entered into sharp competition by proposing to donate to its use named sums of money, or its equivalent. Champaign county offered a large brick building, erected for a seminary, and nearly completed, about 1,000 acres of land for a campus and adjoining farms, and $100,000 in county bonds. To this the Illinois Central railroad added $50,000 in freight.

The state legislature has from time to time appropriated various sums for permanent improvements, as well as for maintenance. The present value of the entire property and assets is estimated at $1,182,000.00.

The institution was incorporated under the name of the Illinois Industrial University the last day of February, 1867, and placed under the control of a board of trustees constituted of the governor, the superintendent of public instruction, and the president of the state board of agriculture, as *ex-officio* members and twenty-eight citizens appointed by the governor. The chief executive officer, usually called president, was styled Regent and he was made, *ex officio*, a member of the board and presiding officer both of the board of trustees and of the faculty.

In 1873 the board of trustees was reorganized by the reduction of the number of members by appointment to nine and *ex officio* to two, the governor and the president of the state board of agriculture. In 1887 a law was passed making membership elective at a general state election and restoring the superintendent of public instruction as an *ex-officio* member. There are, therefore, now three *ex-officio* members and nine by

public suffrage. Since 1873 the president of the board has been chosen by the members thereof from among their own number, for a term of one year.

In consideration of the offer of Champaign county the institution was located, May 8, 1867, in the suburbs of Urbana adjoining those of Champaign. For greater convenience most use has been made of the post office of the latter place. The University was opened to students March 2, 1868, at which time there were present beside the Regent, three professors, and about fifty students mostly from the vicinity. During the first term another instructor was added, and there was a total enrollment of 77 students, all young men.

This was a small beginning, but plans had been formulated for a great institution of learning. In the first report of the committee on courses of study, adopted May 8, 1867, six general departments were outlined and under these there were named fifteen courses of study. The development of the University as it is now known is a remarkable fulfillment of the ideas of the founders as expressed in this notable document. The leading thought therein embodied, of a true collegiate education specially adapted to the industries as distinguished from the professions, was at the time essentially new in the actual organization of an institution of learning, and the plans then laid down were substantially original, though based upon the laws of congress and of the state and in part upon the discussions which led to their enactment, and though others were elsewhere at work upon the same problem. After describing the proposed University and its prospective benefit to the state the glowing enthusiam of the writers is thus expressed:

"Let the state open wide then this Pierian fount of learning. Let her bid freely all her sons to the full and unfailing flow; those whose thirst or whose needs are little to what they require; those whose thirst and whose capacities are large to drink their fill. Let the University be made worthy of the great state whose name it bears; worthy the grand and splendid industries it seeks to promote, and worthy of the great century in which we live."

From the small beginning in 1868 evident progress has been made, not only towards the embodiment of theoretical conceptions in actual courses of instruction, but also in the dissemination of the idea that education in its highest and widest reaches is appropriate for and helpful in all vocations and conditions of life, and that the possibility of securing it should be within the compass of all capable minds. On the one hand the general importance of such education in industrial as well as in professional pursuits has been acknowledged, and on the other the

duty of the state to provide it has been emphasized. With many obstacles encountered and various vicissitudes endured, the University itself and the central idea upon which it was founded have made long strides forward in fact and in public esteem.

During the first term classes were instructed in algebra, geometry, natural philosophy, history, rhetoric, and Latin. Along with this, work on the farm and gardens or around the buildings was compulsory for all students. But in March of the next year compulsory labor was discontinued, save when it was made to serve as a part of class instruction. A chemical laboratory was fitted up during the autumn of 1868, and students then began practical work in the department. Botanical laboratory work was commenced the following year. In January, 1870, a temporary mechanical shop was fitted up with tools and machinery, and in this little wooden building, originally constructed for a carpenter shop, was begun the *first shop-instruction* in American universities. During the summer of 1871, a large brick structure, the present Machinery Hall, was erected and equipped for students' shop work in both wood and iron, and in 1876 a diploma of merit was awarded for the exhibition in this line made at the Centennial Exposition.

By vote, March 9, 1870, the trustees admitted women as students, and during the year 1870-71, twenty-four availed themselves of the privilege. Since that time they have constituted about one-sixth to one-fifth of the total number of students. In 1875 a course in domestic science and art was organized. This was maintained five years, when, upon the withdrawal of the professor in charge, it was abandoned.

By the original state law certificates showing the studies pursued and the attainments in each were substituted for the usual diplomas and degrees. The certificates not proving satisfactory to the holders, the alumni petitioned the legislature in 1877 to give the University authority to confer degrees, and such authority was granted.

Again upon motion of members of the alumni, seconded by trustees and faculty, the legislature was asked in 1885 to change a former action by that body. The word *industrial*, as used in connection with public institutions, had become associated with those of a penal or reformatory kind, and, in consequence, many ludicrous and sometimes embarrassing mistakes were made as to the character and purpose of the University. Instead of the splendid conception of high, collegiate education preparatory to and in aid of the great industries of the age, people were too often led to suppose the state had provided a place for destitute children or for young culprits. From the beginning the institution had been recognized as the state University and all the discussion leading to

its establishment was based upon this idea. No change was now sought in its character or in its relations, but a name better expressive to the public mind of that character and relation was desired; the Industrial University became the University of Illinois. For the year during which the change of name occurred there were 51 per cent of the students in technical courses: during this last year there are nearly 65 per cent in these courses.

During the same session of the legislature a bill was passed transferring the State Laboratory of Natural History from the Illinois State Normal University to the University of Illinois. This Laboratory was created by law for the purpose of making a natural history survey of the state, with the publication of the results in series of bulletins and reports; and for the allied purpose of furnishing specimens illustrative of the flora and fauna of the state to the public schools, and to the state museum. For these purposes direct appropriations are made by the legislature from session to session. A large amount of material has been collected and extended publications have been made in both the forms above mentioned. The Laboratary makes a large exhibit at the World's Columbian Exposition.

By an act approved March 2, 1887, the national government appropriated $15,000 per annum to each state for the purpose of establishing and maintaining, in connection with the colleges founded upon the congressional act of 1862, an agricultural experiment station "to aid in acquiring and diffusing among the people of the United States useful and practical information on subjects connected with agriculture, and to promote scientific investigation and experiment respecting the principles and applications of agricultural science." Under this provision the station for Illinois was placed under the direction of the trustees of the University and its grounds were located on the University farm. At least one bulletin of results is published every three months, and they are for gratuitous distribution. Editions of 13,000 copies are now issued.

For the more complete endowment of the state institutions founded upon the act of 1862, the congress of the United States made further appropriations by a supplementary law passed in 1890. Under this enactment each such college or university received the first year $15,000, the second $16,000, and likewise thereafter $1,000 per annum additional to the amount of the preceding year. The annual increase is to continue until the amount reaches $25,000, which sum is then to be paid yearly thereafter. Putting the congressional aids together there is made an exceedingly encouraging example for the state authorities to imitate. It cannot be said that the Illinois legislature has in the past contributed

liberally to the University; but a disposition to do so has been much more manifest in recent sessions of that body. Besides $70,000 for a science building, the 37th General Assembly (1891) appropriated for the use of the University for two years the sum of $65,044.23. At the date of this writing the 38th General Assembly has not completed its work in this respect. To date the total appropriations by the state to the University for all purposes whatsoever amount to $584,200.

It has been mentioned that 77 students attended the first term in 1868. The total enrollments for the succeeding years to the present are as follows: 128, 180, 274, 381, 400, 405, 368, 370, 388, 387, 399, 414, 382, 352, 382, 330, 332, 362, 343, 377, 417, 469, 519, 583, 714.

It will be noted that for the last ten years each year, with a single exception, shows a gain over that preceding. The last year's gain is much the greatest, reaching 21 per cent over the attendance for 1892 and nearly 40 per cent over that for 1891. The following table gives details of attendance since 1881-82:

ATTENDANCE OF STUDENTS IN THE SEVERAL DEPARTMENTS OF THE UNIVERSITY, FOR THE YEARS 1881–82 TO 1892–93.

Year.	Agriculture	Mechanical Engineering	*Electrical Engineering	Civil Engineering	†Municipal and Sanitary Engineering	Mining Engineering	Architecture	†Architectural Engineering	Chemistry	Natural History	Art and Design	English and Modern Languages	Ancient Languages	Unclassified	Men	Women	Total
1881–82.	21	41	....	41	....	3	14	....	42	14	4	119	4	40	276	76	352
1882–83.	28	39	....	52	....	3	18	....	40	11	7	117	15	47	289	93	382
1883–84.	24	45	....	51	....	2	21	....	26	17	6	94	8	43	261	69	330
1884–85.	21	56	....	58	....	1	26	....	23	20	11	102	4	34	292	70	362
1885–86.	25	53	....	43	....	3	24	....	27	18	8	102	7	19	269	63	332
1886–87.	29	65	....	45	....	4	28	....	25	21	5	84	6	31	289	54	343
1887–88.	23	57	....	53	....	4	46	....	15	34	14	85	8	39	305	72	377
1888–89.	16	74	....	62	....	6	59	....	20	54	9	85	14	19	346	71	417
1889–90.	14	78	....	71	....	6	61	....	40	53	3	101	15	27	392	77	469
1890–91.	22	78	1	95	....	5	73	....	51	51	4	95	17	27	444	75	519
1891–92.	11	88	29	87	....	6	92	....	45	53	7	104	17	44	494	89	583
1892–93.	40	82	87	93	1	7	98	15	52	71	10	106	36	16	610	104	714

*Not separately classified until 1890–91.
†Not separately classified until 1892.

This shows that the marked increase has been in certain of the courses of engineering. The courses in architectural engineering and in

sanitary engineering are new with this year and the course in electrical engineering was established two years ago. The number of students pursuing architectural studies is greater than at any other collegiate institution in this country.

What the University now is and what it most needs can be seen by the presentation made in this catalogue, and by the very extensive exhibition of its material facilities and products in the Illinois building at the Columbian Exposition. That much has been accomplished may be granted; that much remains to be done is well recognized by those in charge.

BUILDINGS AND GROUNDS.

The land occupied by the University and its several departments embraces about 610 acres, including stock farm, experimental farm, orchards, forest plantation, arboretum, ornamental grounds, and military parade grounds.

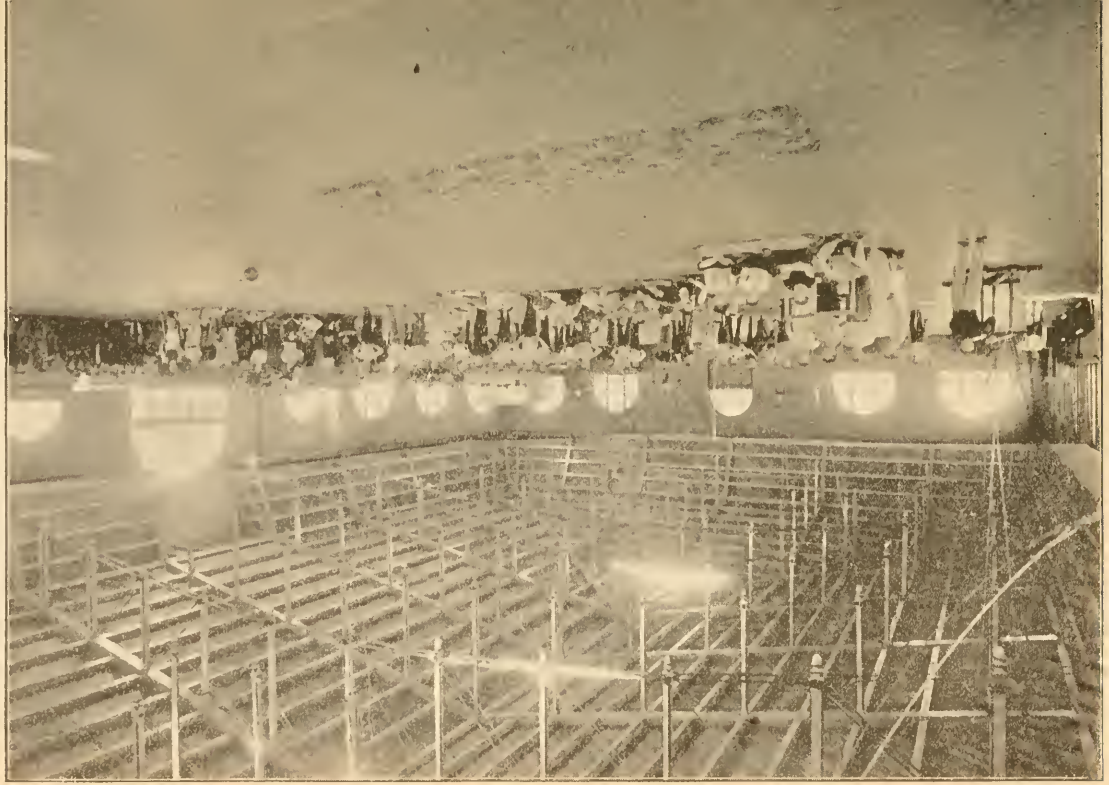
University Hall, designed wholly for public uses, occupies three sides of a quadrangle, measuring 214 feet in front and 122 feet upon the wings. The library wing contains in spacious halls the museum of natural history, the library, the art gallery, and the museum of industrial art. The chapel wing contains the chapel, the physical laboratory and lecture room, and rooms occupied by the departments of architecture, and of art and design. In the main front are convenient class rooms, and on the upper floor elegant halls for literary societies.

The Chemical Laboratory is a building 75 by 120 feet, and two stories high, besides well-lighted basement and mansard stories. It contains the general laboratories for students, instructors' laboratories, lecture rooms, store rooms, scale rooms, and various apartments for special purposes.

Machinery Hall is of brick, 126 feet in length, and 88 feet in width. It contains a boiler room, a machine shop furnished for practical use with a steam engine and lathes, and other machinery; pattern and finishing shop; testing laboratory; shops for carpentry and cabinet work, furnished with wood-working machinery. The blacksmith shop contains sixteen forges with anvils and tools, and a cupola for melting iron.

Natural History Hall is a handsome building 134 by 94 feet, with basement, two main stories, and an attic. It is occupied by the departments of botany, zoölogy, mineralogy, geology, and physiology, for each of which there are laboratories, lecture rooms, and offices.

Military Hall, 100 by 150 feet in one grand hall, gives ample space for company and battalion maneuvers and for large audiences



upon special occasions. It is also used as a gymnasium, for which there are dressing rooms with lockers. A bath room is provided.

There are, in addition, a veterinary hall, a small astronomical observatory, three dwellings, two large barns, and a greenhouse.

MUSEUMS AND COLLECTIONS.

The museum of zoölogy and geology occupies a hall 61 by 79 feet, with a gallery on three sides, and is completely furnished with wall, table, and alcove cases. It contains interesting and important collections, equaled at few, if any, of the colleges of the West. They have been specially selected and prepared to illustrate the courses of study in the school of natural history, and to present a synoptical view of the zoölogy of the state.

Zoölogy.—The mounted mammals comprise an unusually large and instructive collection of the ruminants of our country, including male and female moose, elk, bison, deer, antelope, etc.; and also several quadrumana, large carnivora and fur-bearing animals, numerous rodents, good representative marsupials, cetaceans, edentates, and monotremes. Fifty species of this class are represented by eighty specimens.

The collection of mounted birds (about five hundred and fifty specimens of three hundred species), includes representatives of all the orders and families of North America, together with a number of characteristic tropical forms. Many of these specimens are excellent examples of artistic taxidermy. A series of several hundred unmounted skins is available for the practical study of species.

The set of skeletons contains examples of all the orders of mammals and birds except the Proboscidia, together with typical representatives of the principal groups of reptiles, amphibians, and fishes.

The cold-blooded vertebrates are also represented by a very useful collection of alcoholic specimens, plaster casts, and mounted skins of the larger species, both terrestrial and marine.

Embryology is illustrated by a set of Ziegler wax models, and several series of slides, sections, and other preparations.

Conchology is illustrated by several thousand shells belonging to seventeen hundred species; together with alcoholic specimens of all classes and orders. The collection of Illinois shells is fair, but incomplete.

The entomological cabinet contains about three thousand species (principally American), named, labeled, and systematically arranged.

The lower invertebrates are represented by several hundred dried specimens and alcoholics, and by a large series of the famous Blaschka glass models.

Botany.—The herbarium contains nearly all the species of flowering plants indigenous to Illinois, including a complete set of grasses and sedges. The flora of North America is fairly well represented, and a considerable collection of foreign species has been made. A collection of fungi includes a very full set of those most injurious to other plants, causing rusts, smuts, moulds, etc. A collection of wood specimens from two hundred species of North American trees well illustrates the varieties of native wood.

Plaster casts represent fruits of many of the leading varieties, as well as interesting specimens of morphology, showing peculiarities of growth, effects of cross-fertilization, etc.

Geology.—The geological collection comprises many of the largest and most remarkable fossils hitherto discovered in the various geological formations, illustrating the general progress of life in the mollusks, fishes, reptiles, and mammals, from the oldest paleozoic time to the present. A fine set of fossils from Germany, and collections suitably arranged for practical study, from this and other states, illustrate the different formations. There is a good collection of foot-prints from the Connecticut river sandstones.

Lithology.—This collection embraces the principal kinds of metamorphic and volcanic rocks; examples of stratification in the limestone and fragmental kinds, with many samples of such rocks as are found most valuable for building purposes.

Mineralogy.—The specimens of minerals show all the groups, and all the important and typical species. All the metals are represented; also many of their most important combinations. Many of the specimens are finely crystalized; these, with a complete set of imported models, fully illustrate crystallography.

Agriculture.—A collection of soils from different portions of Illinois and other states; many varieties of corn, wheat, and other cereals and seeds; specimens illustrating the official state inspection of grains at Chicago, showing the quality of the different grades recognized; models of agricultural inventions; models illustrating modes and materials for drains; casts of ancient plows; engravings, lithographs, and photographs of typical animals of noted breeds.

The farms give good illustrations of farm buildings, implements, machinery, modes of culture, and of domestic animals of various classes.

Physics.—The cabinets of the physical laboratory contain a collection of apparatus from the most celebrated European and American makers, illustrating the subjects of mechanics, pneumatics, optics, and electricity.

A series of standard weights and measures from the office of the Coast and Geodetic Survey of the United States may be consulted at the physical laboratory.

ART GALLERY.

The University art gallery was the gift of citizens of Champaign and Urbana. It occupies a beautiful hall 61 by 79 feet, and the large display of art objects has surprised and delighted all visitors. In sculpture it embraces thirteen full size casts of celebrated statues, including the Laocoön group, the Venus of Milo, etc., forty statues of reduced size, and a large number of busts, ancient and modern, bas reliefs, etc., making over four hundred pieces. It includes also hundreds of large autotypes, photographs, and fine engravings, representing many of the great masterpieces of painting of nearly all the modern schools. Also a gallery of historical portraits, mostly large French lithographs of peculiar fineness, copied from the great national portrait galleries of France. The value of this splendid collection, as a means of education, is shown in the work of the course of drawing and design of the University.

MUSEUM OF INDUSTRIAL ARTS.

A large room is devoted to a museum of practical art, the materials for which are constantly accumulating in the various scientific departments. Prominent among the agricultural specimens here exhibited is an excellent collection of the sub-species and varieties of Indian corn, including the best of their kinds; a considerable collection of small grains and of grasses; a collection of fibers in various states of manufacture, and a series of analyses of grains showing at a glance the elements and proportion of structure. The museum contains full lines of illustrations of the work of the shops; models made at the University or purchased abroad; drawings in all departments; Patent Office models, etc., samples of building materials, natural and artificial; a large collection illustrating the forestry of Illinois, Florida, and California; with whatever may be secured that will teach or illustrate in this most important phase of University work. The elegant exhibit made by the University at the Centennial and Cotton Exposition at New Orleans, finds a permanent abode in this apartment.

A notable feature of this collection is the gift of Henry Lord Gay, architect, of Chicago. It consists of a model in plaster, and a complete set of drawings of a competitive design for a monument to be erected in Rome, commemorative of Victor Emanuel, first king of Italy. The monument was to be of white marble, an elaborate gothic structure, beautifully ornamented, and 300 feet high. Its estimated cost was to have been seven and a quarter millions of francs. The design was placed by the art committee second on a list of 289 competitors. Mr. Gay's generous gift occupies the place of honor in the museum of industrial arts.

LIBRARY.

The library, selected with reference to the literary and scientific studies required in the several courses, had May 5, 1893, 25,519 volumes.

The large library hall fitted up as a reading-room, is open throughout the day for study, reading and consulting authorities. It is intended that the use of the library shall largely supplement the class room instruction in all departments. Constant reference is made in classes to works contained in the library, and their study is encouraged or required. The reading room is well provided with American, English, French and German papers and periodicals, embracing some of the most important publications in science and art.

The library of the State Laboratory of Natural History is rich in the world's best literature upon biological sciences, and affords advanced students excellent opportunities for work in this line.

The library of the Agricultural Experiment Station has 3,350 volumes and 1,900 pamphlets. This is also accessible to students.

LABORATORIES.

These essential facilities for modern educational work have been provided at the cost of large sums of money, and of much care to have them best suited for their various purposes. They are thoroughly well equipped.

The chemical laboratories occupy a building 75 by 120 feet, four stories high, including basement and mansard. The basement is used for storage, and for work in mining and metallurgy; the first floor has a lecture room, a laboratory for quantitative work for one hundred and fifty students, and several subsidiary rooms; the second floor, its laboratories for qualitative analysis, private work, lecture room, store room, etc.; and on the uppermost floor is the laboratory of the Agricultural Experiment Station, and apartments for photography.

Natural History Hall is occupied with the laboratories and lecture rooms for the work and instruction in botany, zoölogy, physiology, min-

eralogy, and geology; it also contains the office and equipments of the State Laboratory of Natural History, and of the State Entomologist, as well as the office and library of the Agricultural Experiment Station. There are six laboratory rooms on each of the main floors—sufficient altogether to accommodate two hundred students, besides offering abundant facilities for the private work of the instructors. The laboratory work in these departments constitutes a very large part of the instruction.

The physical laboratory and lecture room are in University Hall, occupying large, well lighted and well arranged apartments. Students have ample facilities for experimental work and opportunity to prosecute it under the guidance of the instructors.

The electrical laboratory, recently fitted up, is also in University Hall. It has five rooms, each especially adapted to its distinct purpose, and equipped for work in experiment and research. The laboratory has its own power from steam and gas engines.

The testing laboratory, located in Machinery Hall, gives opportunity to students of the College of Engineering to make various practical experiments and tests, and to prosecute original investigations in the lines of their specialties.

The mechanical laboratory occupies a large part of both floors of the Machinery Hall, and each of its departments is equipped for practical work by students. There is a large machine shop with hand and machine tools for all the required operations, a pattern shop, a blacksmith shop, a foundry, a boiler room, etc.

The architectural workshops, in the same building with the mechanical laboratory, are fully equipped for bench and lathe work, and are supplied with all essential machine tools. Students become familiar with the tools and the work of the carpenter and cabinet-maker, as well as with the draughting operations of the architect's office.

The laboratory for mining engineers, located in the Chemical Laboratory, is equipped upon a large scale for the work in ore dressing, assaying, metallurgy, and surveying. Students make use of machinery, furnaces and instruments as in practical work.

The farms, fruit and forestry plantations, and gardens offer abundant illustrations of the work associated with the courses of instruction in agriculture and horticulture. The varied and carefully conducted operations of the Agricultural Experiment Station afford excellent aids to students in these departments. For its specific purposes there are used about one hundred of the six hundred and ten acres comprised in the University farms and grounds.

GENERAL LIST OF SUBJECTS.

This list gives all the subjects and the entire number of courses of instruction offered to students of the University. Fuller information will be found under these main headings appropriately distributed under the different colleges and schools, where they may be readily found by reference to the index. The arrangement here is alphabetical.

AGRICULTURE—

1. Farm Equipment. Fall term, full study.
2. Animal Husbandry. Winter term, full study.
3. Rural Economy. Winter term, full study.
4. History of Agriculture. Spring term, half study.
5. Rural Law. Spring term, half study.

ANTHROPOLOGY—

1. Origin and Progress of Man. Fall term, half study.

ARCHITECTURE—

1. Shop Practice B. Fall, winter, and spring terms, full study.
2. General Architectural Construction. Fall and winter terms, full study.
3. Sanitary Construction. Spring term, full study.
4. Architectural Drawing. Fall and winter terms, full study.
5. History of Architecture. Winter and spring terms, full study.
6. Roofs. Spring term, full study.
7. Architectural Perspective. Fall term, full study.
8. Superintendence, Estimates, and Specifications. Fall term, full study.
9. Advanced Graphics. Fall term, full study.
10. Heating and Ventilation. Winter term, full study.
11. Architectural Designing. Winter and spring terms, full study.
12. Esthetics of Architecture. Spring term, full study.

13. Architectural Course in Artistic Drawing and Modeling. For second year students. Fall, winter, and spring terms, full study.

14. Architectural Course in Artistic Drawing and Modeling. For fourth year students. Fall, winter, and spring terms, full study.

ART AND DESIGN—

1. For special students of Art and Design. Three years, double study.

2. For special students of Design. Three years, double study.

3. For students in Architecture. Two years, full study.

4. For students in Agriculture and Natural Science. Fall, winter, and spring terms, full study.

5. For students in Mechanical, Electrical, and Civil Engineering, and Chemistry. Fall and winter terms, full study.

6. For students in College of Literature. Three or six terms, full study.

7. History of Art. Winter term, one lecture a week.

BIOLOGY—

1. General Advanced Study. Spring term, full study.

BOTANY—

1. Histology, Morphology, and Physiology. Fall, winter, and spring terms, full study.

2. Bacteriology. Fall term, full study.

3. Systematic Botany. Winter term, full study.

4. Reproduction. Spring term, full study.

5. Investigations and Thesis. Winter and spring terms, full study.

6. General Botany. Spring term, full study.

CHEMISTRY—

1. General and Experimental Chemistry. Fall term, full study.

2. Inorganic Chemistry. Winter and spring terms, half study.

3. Qualitative Analysis. Winter term, full study.

4. Advanced Qualitative Analysis. Spring term, full study.

5 Quantitative Analysis. Fall term, full study.

6. Volumetric Analysis. Winter term, full study.

7. Agricultural Chemistry. Spring term, full study.

8. Technological Chemistry. Fall term, full study.

9. Organic Chemistry. Winter and spring terms, full study.

10. Sanitary Chemistry. Fall term, full study.

11. Investigation and Thesis. Winter and spring terms, full study.

12. Advanced Work for agricultural students. Fall, winter, and spring terms, full study.

13. Assaying. Winter term, full study.

14. Metallurgy. Spring term, full study.

15. Organic Analysis. Spring term, full study.

Arrangements may be made for special course of advanced work.

CIVIL ENGINEERING—

1. Land Surveying. Fall term, full study.

2. Topographical Drawing and Surveying. Winter and spring terms, half study.

3. Transit Surveying and Leveling. Winter and spring terms, half study.

4. Railroad Engineering. Fall term, full study.

5. Masonry Construction. Fall term, half study.

6. Geodesy. Fall term, half study.

7. Practical Astronomy. Fall term, half study.

8. (*a*) Bridge Analysis. (*b*) Bridge Designing. Winter and spring terms, full study.

9. Tunneling. Spring term, full study.

10. Surveying. Spring term, full study.

DESCRIPTIVE ASTRONOMY—

1. For students in Colleges of Agriculture, Science, and Literature. Spring term, full study.

2. For students in College of Engineering. Spring term, full study.

ELECTRICAL ENGINEERING—

1. Electrical Measurements. Spring term, full study.

2. Electrical Laboratory. Fall term, full study.

3. Electro-Magnetism and Dynamo-Electric Machinery. Winter term, full study.

4. Dynamo Laboratory. Winter term, full study.

5. Alternating Currents and Machines. Spring term, full study.

6. Installation of Light and Power Plants. Spring term, full study.

7. Photometry. Spring term, full study.

ENGLISH LITERATURE—

1. (*a*) English Literature. (*b*) Higher English Grammar. Fall winter, and spring terms, full study.

2. (*a*) Shakspere. (*b*) History of the Drama. (*c*) English Prose Fall, winter, and spring terms, full study.

3. (*a*) Poetry of the 19th Century. (*b*) Old and Early English. Fall, winter, and spring terms, full study.

4. (*a*) Prose of the 18th Century. Fall and winter terms. (*b*) Literary Study of History. Spring term. (*c*) Early English, continued. Fall term. (*d*) Chaucer's Canterbury Tales. Winter and spring terms. The whole, a full study.

5. For students in Colleges of Agriculture, Engineering, and Science. (*a*) General Survey of English Literature. Fall and winter terms. (*b*) Study of Scientific Prose. Spring term. (*c*) Higher English Grammar. Fall, winter, and spring terms. The whole, a full study.

ENTOMOLOGY—

1. General and Economic Entomology. Winter and spring terms, full study.

FRENCH—

1. For students in College of Literature. Fall, winter, and spring terms, full study.

2. For students in College of Literature. Fall, winter, and spring terms, full study.

3. For students in College of Literature. Fall, winter, and spring terms, full study.

4. For students in Colleges of Agriculture, Engineering, and Science. Fall, winter, and spring terms, full study.

GENERAL ENGINEERING DRAWING—

1. Elements of Draughting. Fall term, full study.

2. Descriptive Geometry. Half of winter term and the spring term.

3. Lettering. Half of winter term.

(Courses 2 and 3 count as a full study for both terms.)

GEOLOGY—

1. General and Economic Geology. For students in College of Science. Winter, spring, and fall terms, full study.

2. Special Advanced Work. Winter and spring terms, full study.

3. Engineering Geology. Winter term, full study.

4. General Geology. Spring term, full study.

GERMAN—

1. For students in College of Literature. Fall, winter, and spring terms, full study.

2. For students in College of Literature. Fall, winter, and spring terms, full study.

3. For students in College of Literature. Fall, winter, and spring terms, full study.

4. For students in Colleges of Agriculture, Engineering and Science. Fall, winter, and spring terms, full study.

GREEK—

1. Herodotus. Fall term, full study.
2. Xenophon's Hellenica. Winter term, full study.
3. Xenophon's Memorabilia. Spring term, full study.
4. Lysias and Demosthenes. Fall term, full study.
5. Plato's Apology and Selections from Phaedo. Winter term, full study.
6. Æschylus's Prometheus Bound and Euripides' Alcestis. Spring term, full study.
7. Seminary, Lyric Poetry. Fall term, full study.
8. Seminary, Thucydides. Winter term, full study.
9. Seminary, Homer. Spring term, full study.

HISTORY—

1. General History. Fall, winter, and spring terms, full study.
2. History of Civilization. Fall term, full study.
3. Constitutional History. Winter and spring terms, full study.
4. Constitutional History for students who have not had course 1. Winter term, full study.

HORTICULTURE—

1. Fruit Culture. Fall term, full study.
2. Forestry. Winter term, half study.
3. Plant Houses and House Plants. Winter term, half study.
4. Gardens. Spring term, full study.
5. Elements of Horticulture. Fall term, full study.

ITALIAN—

1. Course of one year. Fall, winter, and spring terms, full study.

LATIN—

1. Livy and Prose Composition. Fall term, full study.
2. Cicero de Amicitia. Winter term, full study.
3. Horace. Spring term, full study.
4. Tusculan Disputations. Fall term, full study.
5. Horace's Satires. Winter term, full study.
6. Tacitus and Roman Archæology. Spring term, full study.
7. Quintilian. Fall term, full study.
8. Juvenal's Satires. Winter term, full study.
9. Cicero de Officiis. Spring term, full study.

MATHEMATICS—

1. Advanced Algebra, for students in Colleges of Agriculture, Science, and Literature. Fall term, full study.

2. Advanced Algebra, for students in College of Engineering. Fall term, full study.

3. Trigonometry, for students in Colleges of Agriculture, Science, and Literature. Winter term, full study.

4. Trigonometry, for Students in College of Engineering. Winter term, full study.

5. Conic Sections. Spring term, full study.

6. Analytical Geometry. Spring term, full study.

7. Calculus and Analytical Geometry. Fall, winter, and spring terms, full study.

MECHANICAL ENGINEERING—

1. Shop Practice A. Fall, winter, and spring terms, full study.

2. Mechanical Drawing and Construction. Fall, winter, and spring terms, full study.

3. Mechanism. Fall term, full study.

4. (*a*) Engineering Materials. (*b*) Steam Engineering. (*c*) Valve Gears. Winter term, full study.

5. Mechanics of Machinery. Spring term, full study.

6. Heat Engines. Fall term, full study.

7. Machine Design. Fall and spring terms, full study.

8. Hydraulic Engines. Winter term, full study.

9. Laboratory Practice. Winter and spring terms, full study.

10. Estimates. Spring term, full study.

METEOROLOGY—

1. Atmospheric Conditions and Movements. Fall term, half study.

MILITARY SCIENCE—

1. Drill Regulations for Infantry. Fall and winter terms, 1 hour a week.

2. Drill Practice. Two years, 2 hours a week.

(Two credits for courses one and two together.)

3. For Officers of the Battalion. Six terms, 2 hours a week.

MINERALOGY—

1. General Course. Fall term, full study.

MINING ENGINEERING—

1. Mine Attack. Fall term, full study.

2. Mine Surveying. Spring term, full study.

3. Ore Dressing. Fall term, full study.
4. Mine Engineering. Winter and spring terms, full study.

Municipal and Sanitary Engineering—

1. Road Engineering. Winter term, full study.
2. Water Supply Engineering. Fall term, full study.
3. Sewerage. Winter term, full study.
4. Botany. Half of winter term, half study.
5. Bacteriology. Fall term, full study.

Pedagogy—

1. Educational Psychology. Fall term, full study.
2. School Hygiene. Winter term, full study.
3. Philosophy of Education. Spring term, full study.
4. History of Education. Fall term, half study.
5. School Supervision. Spring term, full study.
6. Pedagogical Seminary. Spring term, half study.

Pharmacy—

1. Beginners' Course. Fall, winter, and spring terms, full study.
2. Advanced Course. Fall, winter, and spring terms, full study.

Philosophy—

1. Psychology. Fall term, full study.
2. Logic. Winter term, full study.
3. History of Philosophy. Spring term, full study.
4. Ethics. Winter term, full study.
5. Experimental Psychology. Winter term, full study.

Physics—

1. Major Course. Fall, winter, and spring terms, full study.
2. Minor Course. Winter term, full study.

Physiology—

1. Human Physiology. Fall term, full study.

Political Economy—

1. Political Economy. Spring term, full study.

Rhetoric and Oratory—

1. Themes and Elocution, for students in Colleges of Agriculture, Engineering and Science. Fall, winter, and spring terms, 3 hours a week. (Two credits.)

2. Themes and Elocution, for Students in College of Literature. First year, 2 hours a week; fourth year, 1 hour a week. (Two credits.)

3. Elocution and Oratory. Elective course. Fall, winter, and spring terms, 2 hours a week. (One credit.)

Final Exams

Classes will have final examinations at the time and date determined by the course (lecture, laboratory, or where

winter, and spring terms, full study.

CHANICS—
Fall term, full study.
als. Winter term, full study.
g term, full study.

ysiology. Fall term, full study.
Practice of Veterinary Medicine. Winter and
y.
a. Fall, winter, and spring terms, full study.

ology, for students in College of Science. Fall, win-
erms, full study.
logy. Fall term, full study.
gation and Thesis. Winter and spring terms, full study.
atic Zoölogy (including Entomology). Fall, winter, and
ull study.
al Zoölogy, minor course. Winter term, full study.

3. Ore Dressing. Fall term, full
4. Mine Engineering. Winter and

Municipal and Sanitary Engineering—
1. Road Engineering. Winter term, fu
2. Water Supply Engineering. Fall ter
3. Sewerage. Winter term, full study.
4. Botany. Half of winter term, half stud
5. Bacteriology. Fall term, full study.

Pedagogy—
1. Educational Psychology. Fall term, full s
2. School Hygiene. Winter term, full study.
3. Philosophy of Education. Spring term, fu
4. History of Education. Fall term, half study
5. School Supervision. Spring term, full study.
6. Pedagogical Seminary. Spring term, half study

Pharmacy—
1. Beginners' Course. Fall, winter, and spring term
2. Advanced Course. Fall, winter, and spring term

Philosophy—
1. Psychology. Fall term, full study.
2. Logic. Winter term, full study.
3. History of Philosophy. Spring term, full study.
4. Ethics. Winter term, full study.
5. Experimental Psychology. Winter term, full study.

Physics—
1. Major Course. Fall, winter, and spring terms, full study.
2. Minor Course. Winter term, full study.

Physiology—
1. Human Physiology. Fall term, full study.

Political Economy—
1. Political Economy. Spring term, full study.

Rhetoric and Oratory—

1. Themes and Elocution, for students in Colleges of Agriculture, Engineering and Science. Fall, winter, and spring terms, 3 hours a week. (Two credits.)

2. Themes and Elocution, for Students in College of Literature. First year, 2 hours a week; fourth year, 1 hour a week. (Two credits.)

3. Elocution and Oratory. Elective course. Fall, winter, and spring terms, 2 hours a week. (One credit.)

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SPANISH—

1. Course of one year. Fall, winter, and spring terms, full study.

THEORETICAL AND APPLIED MECHANICS—

1. Analytical Mechanics. Fall term, full study.
2. Resistance of Materials. Winter term, full study.
3. Hydraulics. Spring term, full study.

VETERINARY SCIENCE—

1. Anatomy and Physiology. Fall term, full study.
2. Principles and Practice of Veterinary Medicine. Winter and spring terms, full study.
3. Materia Medica. Fall, winter, and spring terms, full study.

ZOÖLOGY—

1. General Zoölogy, for students in College of Science. Fall, winter, and spring terms, full study.
2. Embryology. Fall term, full study.
3. Investigation and Thesis. Winter and spring terms, full study.
4. Systematic Zoölogy (including Entomology). Fall, winter, and spring terms, full study.
5. General Zoölogy, minor course. Winter term, full study.

ORGANIZATION.

I. The College of Agriculture:
Course in Agriculture.
Course in Veterinary Science.
Course in Horticulture.
Junior Course in Agriculture.

II. The College of Engineering:
Course in Mechanical Engineering.
Course in Electrical Engineering
Course in Civil Engineering.
Course in Municipal and Sanitary Engineering.
Course in Mining Engineering
Course in Architecture.
Course in Architectural Engineering.

III. The College of Science:
School of Chemistry.
School of Natural Science.

IV. The College of Literature:
School of English and Modern Languages.
School of Ancient Languages.
School of Philosophy and Pedagogy.

Additional Schools not distinctly attached to any of the Colleges:
School of Military Science.
School of Art and Design.

V. Graduate School.

Vocal and Instrumental Music are also taught, but not as parts of any regular course.

Preparatory Classes.—To meet an urgent demand, the Trustees have temporarily provided for teaching the preparatory studies lying between the work of the elementary common schools and that of the University.

COLLEGE OF AGRICULTURE.

COURSES.

AGRICULTURE; VETERINARY SCIENCE; HORTICULTURE; JUNIOR COURSE IN AGRICULTURE.

FACULTY.

THOMAS J. BURRILL, PH.D., ACTING REGENT, Botany and Horticulture.
GEORGE E. MORROW, M.A., *Dean*, Agriculture.
STEPHEN A. FORBES, PH.D., Zoölogy and Entomology.
CHARLES W. ROLFE, M.S., Geology.
DONALD MCINTOSH, V.S., Veterinary Science.
ARTHUR W. PALMER, SC.D., Chemistry.
SAMUEL W. PARR, M.S., Analytical Chemistry.
FRANK D. GARDNER, B.S., Agriculture.

MEMBERS OF OTHER FACULTIES GIVING INSTRUCTION IN THIS COLLEGE.

EDWARD SNYDER, M.A., German.
JAMES D. CRAWFORD, M.A., History.
JAMES H. BROWNLEE, M.A., Rhetoric and Oratory.
FRANK F. FREDERICK, Industrial Art and Design.
ELBRIDGE R. HILLS, Captain U.S.A., Military Science.
M. R. PARADIS, M.A., French.
DANIEL K. DODGE, PH.D., English Language and Literature.
GEORGE W. MYERS, M.L., Mathematics.
DANIEL W. SHEA, PH.D., Physics.
GEORGE W. PARKER, Wood Work.
HOWARD S. BRODE, Zoölogy.

COLLEGE OF AGRICULTURE.

The College of Agriculture aims to give a liberal and practical education, based largely on the natural and physical sciences, but supplementing these with technical or professional studies in which the

application of science to the best modern practice of agriculture is carefully considered. The purpose is to prepare its students to be intelligent and successful farmers or horticulturists; teachers of agriculture in schools or colleges, or through the agricultural press, or to be investigators in the agricultural experiment stations of the country. It also gives a good foundation in the study of veterinary science.

Shorter courses are provided for those who already have a good scientific education and for those who desire to pursue the technical studies with special reference to their practical applications.

This college has the advantage of a close connection with the other colleges of the University, especially with the College of Science. The libraries, laboratories, museums, and collections of the University are a part of its equipment

Methods of Instruction.

So far as is practicable, the professional studies are taught after a study of the sciences with which agriculture is most closely related. They are taught mainly by lectures with use of text-books where suitable ones are available. Readings are prescribed in standard agricultural books and periodicals. Large use is made of the publications of agricultural experiment stations. Frequent written or oral discussions of the principles taught are required of the student. Principles are also illustrated by observations in the fields, stables, orchards, gardens, etc., of the University, or in the vicinity.

The constant aim is to aid the student in forming habits of careful and accurate observation and investigation; to lead him to seek the reasons for agricultural methods as well as to learn rules of practice; to teach him how to use the sources of knowledge concerning agriculture; and to help him to become an intelligent, progressive citizen and business man.

Equipment.

The College has for the illustration of practical agriculture, a stock farm of 400 acres, provided with a large stock barn fitted up with stables, pens, yards, etc.; also an experiment farm of 180 acres, furnished with all necessary apparatus to illustrate the problems of breeding and feeding. It has specimens of heavy draft, farm and roadster horses, and of Shorthorn, Hereford, Holstein and Jersey cattle, and of Poland-China swine.

The Agricultural Experiment Station, established as a department of the University, exhibits field experiments in testing the different varieties and modes of culture of field crops, and in the comparison and treatment of soils. It carries on experiments in agriculture, horticulture, dairying and in feeding animals of different ages and development upon the various kinds of food. In common with similar departments in the several agricultural colleges of the country, it attempts to create positive knowledge towards the development of an agricultural science. A dairy house, fitted with a cream separator, apparatus for deep and shallow setting of milk, churns, etc., is used in illustration of dairy processes.

Surveying and drainage are illustrated by field practice, with instruments, and by models. Agricultural chemistry is pursued, in connection with laboratory practice, in the analysis of soils, fertilizers, foods, etc. The College has fine collections of soils, seeds, plants, implements, models, and skeletons of domestic animals, charts, and other apparatus, including a large number of models of agricultural machinery.

Upon the grounds devoted to the use of the college are: An apple orchard, containing numerous varieties, planted in 1869; also many varieties of pears, cherries, grapes, and small fruits; a forest tree plantation, embracing the most useful kinds of timber; an arboretum, in which all hardy, indigenous, and exotic trees are planted as fast as they can be secured, and which now contains nearly one hundred varieties.

The ornamental grounds which surround the University buildings contain about twenty acres, and are kept in neat and attractive style. These, with all the adjuncts of trees and flowering shrubs, lawns, beds of flowers and foliage plants, walks of different materials and styles of laying out, give illustration to the class room work in landscape gardening. A greenhouse contains a collection of plants of great value for the classes in floriculture and landscape gardening, besides furnishing students with practice in greenhouse management.

The extensive fruit plantations of the Agricultural Experiment Station give abundant opportunity for studies and illustrations in many horticultural lines, and add greatly to the effectiveness of class room work.

The cabinet contains a series of colored plaster casts of fruits prepared at the University; models of fruits and flowers by Auzoux, of Paris; collections of seeds of native and exotic plants, of specimens of native and foreign woods, of beneficial and injurious insects, and of specimens showing their work; numerous dry and alcoholic specimens and preparations; maps, charts, diagrams, drawings, etc.

The College has a supply of compound microscopes and apparatus, and students have opportunity to learn their use, and to make practical

investigations with them. The herbarium is rich in specimens of useful and noxious plants, including many of the fungous parasites which cause disease to cultivated crops.

COURSES OF INSTRUCTION.

Agriculture.

1. Farm Equipment.—Careful consideration is given to the planning and methods of construction of farm buildings; to the division of the farm into fields; to a comparison of different methods of fencing, with methods of construction and care of each; to laying out, constructing, and maintaining roads. Especial attention is given to the improvement of the farm by drainage; the reasons for drainage, laying out drains, methods of leveling, estimating size of tile, and depth of drains best adapted for different situations being fully explained. Field practice accompanies the class room work. The selection, use, and care of farm implements and machinery receive full consideration. *Lectures and Reference Reading. Fall term, full study.* Professor Morrow.

2. Animal Husbandry.—The leading principles of breeding and the practical methods of feeding and managing farm animals, horses, cattle, sheep, and swine, are discussed. The purpose served by food, and the best methods of feeding for the economical production of meat, dairy products, wool, etc., are explained with free use of the records of practice by successful breeders and feeders in this and other countries. The history, characteristics, and adaptations of all important breeds of farm animals are studied. Students are given the opportunity of carefully studying animals and judging them with reference to breed characteristics and their adaptations to different uses. Practice is given in study of pedigrees. *Lectures and Reference Reading. Winter term, full study.* Professor Morrow.

3. Rural Economy.—The relation of agriculture to other industries; the advantages and disadvantages of different systems, as stock rearing, dairying, grain farming; of specialties and general farming, and the circumstances which make each desirable, are discussed. The culture of farm crops, cereals, roots, grasses, etc., including choice of varieties, preparation and cultivation of the soil, harvesting and utilization of each, receives as full attention as time permits. *Lectures and Reference Reading. Winter term, full study.* Professor Morrow.

4. History of Agriculture.—The development of agriculture, especially in comparatively recent times and in our own country, is studied with particular reference to the effects of climate, different phases of civilization and of legislation in advancing or retarding it. The history and characteristics of agricultural organizations of various classes are considered, and a survey is taken of agricultural literature. *Lectures and Reference Reading. Spring term, half study.* Professor MORROW.

5. Rural Law.—The object of this study is to enable the student to familiarize himself with some fundamental principles of law and with the special laws which most directly affect the farmer. Tenure of real estate; laws relating to roads, fences, drainage, etc., as well as the most important parts of commercial law are considered. *Lectures and Reference Reading. Spring term, half study.* Professor MORROW.

VETERINARY SCIENCE.

1. Anatomy and Physiology.—The anatomy and physiology of the domestic animals constitute the subjects of instruction for a term. The instruction is given by lectures, aided by demonstrations with use of skeletons and models illustrating the details of structure and formation of parts. This is supplemented by the study of text-books. *Strangeway's Veterinary Anatomy; Smith's Physiology of the Domestic Animals. Fall term, full study.* Professor MCINTOSH.

2. Principles and Practice of Veterinary Medicine.—This subject comprises veterinary medicine, surgery, and hygiene, and is taught by lectures and text books, and illustrated by specimens of morbid anatomy, with observations and practice at the clinics. The latter are held at the veterinary infirmary, where a large number of animals are treated or operated upon once each week. Dissections and post mortems are made. *Williams's Practice of Veterinary Medicine and Surgery; Courtney's Practice of Veterinary Medicine and Surgery. Winter and Spring terms, full study.* Professor MCINTOSH.

Materia Medica.—The substances and agents used for the prevention or cure of disease and for the preservation of health are studied in this course. The instruction is given by lectures and text-books. In the illustrative collections are specimens of all the drugs used. *Dun's Veterinary Materia Medica; Wood's Human Materia Medica. Fall, winter, and spring terms, full study.* Professor MCINTOSH.

Horticulture.

1. Fruit Culture.—Orchards, vineyards, small fruit plantations and their products constitute the main subjects of this term's work. Lectures are given upon propagating, planting, and cultivating trees and vines; upon identifying, classifying, and preserving fruits, and upon diseases and remedies. Studies are made upon illustrative material in the laboratory, and visits to the orchards and plantations form a part of the instruction. *Fall term, full study.* Professor Burrill.

2. Forestry.—This course embraces a study of forest trees and their uses, their natural distribution, and their artificial production. The relations of forests and climate are studied, and the general topics of forestry legislation and economy are discussed. *Lectures. Winter term, half study.* Professor Burrill.

3. Plant Houses and House Plants.—This study includes gardening and landscape architecture; the methods of construction, heating and ventilation, and general management of greenhouses, and the study of the kinds, propagation, growth, and care of flowering plants. Each student has practice in propagating by cuttings and otherwise, in potting and shifting, and in care of plants requiring various treatment. Insects and diseases, with remedies, are treated and the means of securing vigor of growth and abundance of flowers are studied and illustrated by practice. *Henderson's Practical Floriculture. Winter term, half study.* Professor Burrill.

4. Gardens.—Kitchen and market gardens are made the first subjects of study, after which ornamental and landscape gardening occupies the time. *Henderson's Gardening for Profit; Long's Ornamental Gardening. Spring term, full study.* Professor Burrill.

5. Elements of Horticulture.—This is a minor course, intended for students who take but one term of horticultural work. The following topics are discussed: Orchard sites; the age of trees to plant; the season to plant; how to plant; what to plant; the management of the soil; pruning and care of trees; gathering and preserving fruit; diseases and injuries; the nursery; ornamental trees and shrubs; flower gardens; vegetable gardens, including propagating beds and houses; the vineyard and small fruits, and timber tree plantation. Students have instruction and practice in grafting, budding, propagation by cuttings, etc. *Lectures. Fall term, full study.* Professor Burrill.

The following subjects, offered to students in the College of Agriculture, are described elsewhere, as noted.

In College of Engineering—
Mathematics, 1, 3, 5; Physics, 1, or 2; Shop Practice, B.

In College of Science—
Chemistry, 1–4, 12; Botany, 1, 2, 3, 4 or 6; Zoölogy, 1, or 5; Entomology, 1; Physiology, 1; Mineralogy, 1; Geology, 1, or 5; General Biology, 1.

In College of Literature—
History, 3; Political Economy, 1; Philosophy, 1; Pedagogy, 2, or 5, or 2 and 3, or 5 and 6; Themes and Elocution, 1; English Language and Literature, 5; German, 1 and 2, or 4; French, 1 and 2, or 4.

In School of Military Science—
Military Science, 1, 2.

CLASSIFICATION OF STUDIES.

For the degree of Bachelor of Science in the College of Agriculture 40 credits are required, each given for the satisfactory completion of the study of a required or elective subject for one term, five exercises a week. Of these credits 23 must be obtained by pursuing the required studies each for the minimum time named below. The other 17 credits may be obtained by pursuing further required studies, or by the prosecution of elective studies.

Students who have completed a four years' course of study in the College of Science may take the professional agricultural studies in one year; and those who have followed a course for two years may take the professional studies, and other scientific or general studies in the last two years of their course.

Students especially interested in animal husbandry or veterinary science may omit some of the horticultural studies; and those preparing for horticultural work may omit veterinary specialties.

REQUIRED STUDIES.

Agriculture—3 to 4 credits.
Horticulture—1 to 3 credits.
Veterinary Science—1 to 4 credits.
Botany—1 to 6 credits.
Chemistry—3 to 9 credits.
Physics—1 to 3 credits.
Mathematics—2 to 3 credits.
French—3 or 6 credits.
German—3 or 6 credits.
Political Economy—1 credit.
Themes and Elocution—2 credits.
Military—2 credits.

ELECTIVE STUDIES.

Bacteriology—1 credit.
Entomology—2 credits.
General Biology—1 credit.
Geology—2 credits.
Mineralogy—1 credit.
Physiology—1 credit.
Zoölogy—3 credits.
Meteorology—½ credit.
Anthropology—½ credit.
Psychology—1 credit.
Pedagogy—2 credits.
Drawing—3 credits.
English Language and Literature—3 credits.
French—3 credits.
German—3 credits.
Constitutional History—1 credit.
Shop Practice—1 credit.

Suggested Courses of Study in Agriculture.

For the guidance of students in the selection of studies the following courses are offered. The first year's work, at least, should be taken as laid down in one of these courses, after which free selection may be made within the limits of the prescribed lists of required and elective subjects. Close correspondence exists for the first two years between these courses and those of the College of Science. The special professional subjects occur in the third and fourth years, or in the fourth alone.

Course 1 is arranged with nearly equal amounts of time given to each of the sciences, and is adapted to students who do not wish to specialize in any one of these subjects. Courses 2 and 3 may be chosen by those who desire to give more attention to chemistry; course 4 by those who wish to make botanical studies a specialty; and course 5 by those who take a year's work in horticulture.

Course one.

FIRST YEAR.

1. Chemistry; Advanced Algebra; Physiology; Military.
2. Chemistry; Trigonometry; Drawing; Military.
3. Chemistry; Astronomy, or Mathematics; Drawing; Military.

SECOND YEAR.

1. Botany; Physics; French; Military.
2. Botany; Physics; French; Military.
3. Botany; Physics; French; Military.

THIRD YEAR.

1. Zoölogy; Mineralogy; German; Themes and Elocution.
2. Entomology; Geology; German; Themes and Elocution.
3. Entomology; Geology; German; Themes and Elocution.

FOURTH YEAR.

1. Farm Equipment; Fruit Culture; Psychology.
2. Rural Economy; Veterinary Science; Animal Husbandry.
3. History of Agriculture and Rural Law; Veterinary Science; Political Economy.

COURSE TWO.

FIRST YEAR.

1. Chemistry; Advanced Algebra; French; Military.
2. Chemistry; Trigonometry; French; Military.
3. Chemistry; Astronomy, or Mathematics; French; Military.

SECOND YEAR.

1. Chemistry; Physiology; German; Military.
2. Chemistry; Zoölogy; German; Military.
3. Chemistry; Botany; German; Military.

THIRD YEAR.

1. Physics; German; Veterinary Science; Themes and Elocution.
2. Physics; German; Veterinary Science; Themes and Elocution.
3. Physics; Geology; Veterinary Science; Themes and Elocution.

FOURTH YEAR.

1. Farm Equipment; Psychology; Horticulture; Thesis.
2. Rural Economy; Animal Husbandry; Constitutional History.
3. History of Agriculture and Rural Law; Vegetable Physiology; Political Economy.

COURSE THREE.

FIRST YEAR.

1. Chemistry; Advanced Algebra; French; Military.
2. Chemistry; Trigonometry; French; Military.
3. Chemistry; Astronomy, or Mathematics; French; Military.

SECOND YEAR.

1. Chemistry; Physics; German; Military.
2. Chemistry; Physics; German; Military.
3. Chemistry; Physics; German; Military.

THIRD YEAR.

1. Chemistry; Botany; Physiology; Themes and Elocution.
2. Chemistry; Botany; Zoölogy; Themes and Elocution.
3. Chemistry; Botany; Geology; Themes and Elocution.

FOURTH YEAR.

1. Farm Equipment; Horticulture; Psychology; Thesis.
2. Rural Economy; Veterinary Science; Animal Husbandry.
3. History of Agriculture and Rural Law; Veterinary Science; Political Economy.

Course four.

FIRST YEAR.

1. Chemistry; Advanced Algebra; French; Military.
2. Chemistry; Trigonometry; French; Military.
3. Chemistry; Astronomy, or Mathematics; French; Military.

SECOND YEAR.

1. Botany; Physics; German; Military.
2. Botany; Physics; German; Military.
3. Botany; Physics; German; Military.

THIRD YEAR.

1. Bacteriology; Zoölogy; Veterinary Science; Themes and Elocution.
2. Systematic Botany; Zoölogy; Veterinary Science; Themes and Elocution.
3. Plant Reproduction; Zoölogy; Veterinary Science; Themes and Elocution.

FOURTH YEAR.

1. Farm Equipment; Horticulture; Psychology; Thesis.
2. Rural Economy; Entomology; Animal Husbandry.
3. History of Agriculture and Rural Law; Entomology; Political Economy.

Course five.

FIRST YEAR.

1. Chemistry; Advanced Algebra; French; Military.
2. Chemistry; Trigonometry; French; Military.
3. Chemistry; Astronomy, or Mathematics; French; Military.

SECOND YEAR.

1. Botany; Physics; German; Military.
2. Botany; Physics; German; Military.
3. Botany; Physics; German; Military.

THIRD YEAR.

1. Bacteriology; Zoölogy; Physiology; Themes and Elocution.
2. Systematic Botany; Zoölogy; Entomology; Themes and Elocution.
3. Plant Reproduction; Zoölogy; Entomology; Themes and Elocution.

FOURTH YEAR.

1 Fruit Culture; Farm Equipment; Psychology.
2. Forestry; Plant Houses; Rural Economy; Constitutional History.
3. Gardens; History of Agriculture and Rural Law; Political Economy.

JUNIOR COURSE IN AGRICULTURE.

A two years' course has been arranged for those who desire some knowledge of the physical and natural sciences as well as the professional

agricultural studies. For admission to this course students should not be less than eighteen years of age, and if under twenty-one years must pass the examinations in the common branches as required for entrance to the preparatory department, and in elementary botany.

Students of sufficient age and attainments may take the professional studies of this course in one year. Horticultural studies may be substituted for veterinary science if desired.

The two years' course is arranged as follows:

Junior Course in Agriculture.

FIRST YEAR.

1. Chemistry; Natural Philosophy; Physiology.
2. Chemistry; Zoölogy; English, or Free Hand Drawing.
3. Chemistry; Botany; English, or Free Hand Drawing.

SECOND YEAR.

1. Farm Equipment; Horticulture; Bacteriology.
2. Animal Husbandry; Veterinary Science; Rural Economy, or Entomology.
3. History of Agriculture, and Rural Law; Veterinary Science; Vegetable Physiology, or Entomology.

Free Short Course.

For the winter term, students are admitted without entrance examination or payment of any fee to a special short course in which there are daily lectures and class exercises concerning some of the most important practical branches of agriculture, horticulture, and veterinary science. This course is designed for young men already engaged in agricultural pursuits who cannot spend a long time in college, and yet are anxious to make the most of themselves and of their vocation. Such students have access to the library and museum collections of the University, and have admission to the courses of general lectures.

The details of this course vary from year to year. A special circular giving full information concerning it will be issued each year several weeks before the opening of the term the first of January.

COLLEGE OF ENGINEERING.

COURSES.

MECHANICAL ENGINEERING; ELECTRICAL ENGINEERING; CIVIL ENGINEERING; MUNICIPAL AND SANITARY ENGINEERING; MINING ENGINEERING; ARCHITECTURE; ARCHITECTURAL ENGINEERING.

FACULTY.

THOMAS J. BURRILL, PH.D., ACTING REGENT, Botany.
N. CLIFFORD RICKER, M.Arch., *Dean*, Architecture.
SAMUEL W. SHATTUCK, C.E., Mathematics.
IRA O. BAKER, C.E., Civil Engineering.
ARTHUR N. TALBOT, C.E., Municipal Engineering and Mechanics.
FRANK F. FREDERICK, Industrial Art and Design.
WALTER J. BALDWIN, B.S., Mining Engineering.
CHARLES W. SCRIBNER, M.E., Mechanical Engineering.
GEORGE W. MYERS, M.L., Mathematics.
DANIEL W. SHEA, PH.D., Electrical Engineering and Physics.
GEORGE W. PARKER, Wood Work.
RUFUS ANDERSON, M.E., Iron Work.
JAMES M. WHITE, B.S., Architecture.
CYRUS D. MCLANE, B.S., General Engineering Drawing.
ALBERT L. KUEHMSTED, M.E., Electrical Engineering.
JAMES D. PHILLIPS, Mechanical Engineering Drawing.

MEMBERS OF OTHER FACULTIES GIVING INSTRUCTION IN THIS COLLEGE.

EDWARD SNYDER, M.A., German.
JAMES D. CRAWFORD, M.A., History.
JAMES H. BROWNLEE, M.A., Rhetoric and Oratory.
CHARLES W. ROLFE, M.S., Geology.
ARTHUR W. PALMER, Sc.D., Chemistry.
ELBRIDGE R. HILLS, Captain U.S.A., Military Science.
SAMUEL W. PARR, M.S., Chemistry.
M. R. PARADIS, M.A., French.
DANIEL K. DODGE, PH.D., English Language and Literature.

COLLEGE OF ENGINEERING.

The purpose of the College of Engineering is thoroughly to educate and prepare engineers and architects for their future professional courses. Its aim must therefore be twofold—general and technical. A considerable proportion of the course of study must be devoted to general and literary work, since a graduate is expected now to arrange his ideas in clear order, and to write or speak effectively, whenever it becomes necessary. Professional success frequently depends upon this power far more than is commonly supposed.

Moreover there is an ever-increasing fund of general and scientific knowledge with which any educated man is expected to be conversant, if he desires to retain the esteem of his associates and clients. Much of the most valuable material is yet locked up in foreign languages, and their keys must be acquired by patient study and practice. Scarcely a single science is not at some time useful to the professional man, and some of them, like mathematics or physics, are so intimately interwoven with the different branches of technical knowledge, as to be practically indispensable, and so require a more thorough mastery than is necessary to the literary man. It might appear that this general training would alone be sufficient to absorb the entire attention of the student during his whole course, but not less than one-half his time must be given to purely technical training, and the acquiring of a professional capital, or stock of information and knowledge of details, which is almost limitless in its demands and possibilities.

The methods employed for embodying new ideas in drawings, intelligible to other professional men and to mechanics, must likewise be acquired.

A knowledge of the latest results of scientific experiments is likewise essential, requiring wide reading by some one, either student or professor. Engineering knowledge must be fresh to be valuable, since ideas and methods are quickly supplanted by improved ones, and become useless except as mile-stones of progress. Consequently the most valuable part of this professional knowledge can never be crystallized in text-books, but must be drawn from the mental stores of the teacher.

General Methods of Instruction.

Whenever suitable text-books can be found they are employed, because saving much time in acquiring facts and data, and because such books become doubly valuable for later reference when enriched by notes and additions. But to arouse and awaken the enthusiasm of the

student, occasional or stated lectures are necessary, and these are fully illustrated by sketches, diagrams, drawings, and photographs of executed work. They are frequently used in the advanced classes, partly because the deficiency of text-books is there most apparent. Additional courses of extended reading are marked out by references to the University library, so that each student may enjoy the greatest possible benefit from the course of instruction. In all courses of study offered by the College, drawing in its manifold forms and uses is made of especial importance both in its use and its modes of execution.

Testing Laboratory.

The testing laboratory has a Riehle testing machine of 100,000 pounds capacity, a smaller apparatus for testing beams, a Riehle cement testing machine, a stone grinding machine, a rattler for abrasion tests of stone and brick, with apparatus for making all necessary measurements and observations, molds, and standard sieves for cement, etc. The laboratory is fitted up as a working laboratory where students may acquire such practice in experimental work as engineers are called upon to perform, as well for the purpose of illustrating principles as for use in original investigation. The ordinary work includes testing metals, wooden beams, cement briquettes, and stone and brick.

The hydraulic laboratory includes elevated tank and stand-pipe, steam pumps for giving high pressure, tanks for measuring flow of water, pressure gauges, meters, water motor, turbine, and other apparatus for experiments with orifices, weirs, etc. The experiments are made in connection with the regular class instruction.

Computing Apparatus.

A collection of machines and apparatus for abbreviating computations and especially for use in the calculation of tables, includes the following instruments:

A Thomas's 10-place arithmometer, giving products of numbers to 20 places. This is the largest size manufactured and was imported especially for the University. It is probably as convenient and accurate as any computing machine yet invented. It performs addition, subtraction, multiplication, and division, and is particularly useful in calculating or verifying numerical tables. Two Thacher's computing scales, for performing multiplication, division, squaring, and extraction of square root. This instrument is sufficiently accurate for almost all purposes, and can be used more rapidly than the former. An Amsler's polar planimeter for

measuring the area of figures of any form, and principally employed in graphic statics, or by mechanical engineers for measuring indicator diagrams. An Amsler's rolling planimeter of largest size, for the same uses as the ordinary planimeter, but producing only one-sixth the error. An Amsler's integrator, which is chiefly employed for obtaining the numerical value of the moment of inertia of any plane figure, especially sections of columns and girders. A Webb's adder for performing addition only.

COURSES OF INSTRUCTION.

Mathematics.

The instruction offered in pure mathematics constitutes two distinct lines of study differing in extent, partially in subject matter, and in the method of presentation. The first is for students in the Colleges of Agriculture, Science, and Literature, and occupies one year, beginning in the fall. It has for its object to promote habits of mental concentration and continuity of thought, to develop the capacity to form and combine abstract conceptions and to cultivate deductive reasoning. The second is primarily offered to students in the College of Engineering and occupies two years, also beginning in the fall. In addition to the educational object just given, the purpose is to enable the student to meet the requirements of his engineering studies. The greater part of the time is necessarily taken up with the theory and its applications to geometrical magnitudes.

The first line of study includes the courses numbered 1, 3, and 5; the second, courses 2, 4, 6, and 7.

1. Advanced Algebra.—For students in the Colleges of Agriculture, Science, and Literature. Functions and their notation; series and the theories of limits; imaginary quantities; general theory of equations. Topical reviews of all preceding algebraic processes. *Wells's University Algebra. Fall term, full study.* Assistant Professor Myers.

2. Advanced Algebra.—For students in the College of Engineering. Principles of small practical value are subordinated to those of higher utility. Accuracy and dispatch in the use of principles are continually emphasized. A topical review of principles of elementary algebra is made from time to time. This review is sometimes made by requiring students to solve practical problems illustrative of principles not well understood. Some of the most important

subjects in which instruction is given are functions and their notation; the progressions; theory of numbers; permutations and combinations; probabilities; convergency and divergency of series; summation of series; undetermined coefficients; doctrine of limits; logarithms and general theory of equations. *Newcomb's College Algebra. Fall term, full study.* Assistant Professor MYERS.

3. Trigonometry.—For students in the Colleges of Agriculture, Science, and Literature. Trigonometry, plane and spherical; fundamental relations between the trigonometrical functions of an angle or arc; relations between the functions of different angles or arcs; construction and use of tables; solution of triangles; angles as functions of sides, and sides as functions of angles; applications. *Wells's Essentials of Trigonometry. Winter term, full study.* Assistant Professor MYERS.

   Required: Math., 1.

4. Trigonometry.—For students in College of Engineering. The ratio system is studied chiefly, but the necessary connection between it and the line system is carefully proved and illustrated. Students are frequently required to demonstrate the same proposition, using first the line values, then the ratio values of the functions. The subjects taught are the circular measurement of angles, general formulæ of plane and spherical trigonometry, relations between functions of multiples of 90° plus or minus an angle, solution of right and oblique plane triangles, of spherical right and oblique triangles, Napier's rules and analogies, and practical applications of principles to the solutions of astronomical problems. Teaching is in part by text book, and in part by assigning principles to be demonstrated and problems to be solved outside of the text book. *Wells's Essentials of Trigonometry. Winter term, full study.* Assistant Professor MYERS.

   Required: Math., 2.

5. Conic Sections (geometrical method).—Definitions and general properties of the ellipse, hyperbola, and parabola; curvature of the conic sections; elements of analytical geometry. Properties and relations of the point and right line in a plane of the conic sections. *Coffin's Sections and Analytical Geometry. Spring term, full study.* Assistant Professor MYERS.

   Required: Math., 1, 3.

6. Analytical Geometry.—The aim is to acquaint the student with analytical methods of investigation, and to familiarize him with some of

the most recent developments in synthetic geometry; to make him more skillful in the use of algebraic processes, especially as a means of demonstrating geometric properties of loci. Subjects considered are the elementary theory of the point and right line in a plane; use of abbreviated notation; elementary theory of the conic sections, their equations and properties developed analytically; poles and polars; synthetic geometry of the circle, and the discussion of the general equation of the second degree. Written work in plotting and discussing loci from their equations is required from time to time. *Newcomb's Analytic Geometry. Spring term, full study.* Assistant Professor MYERS.

Required: Math., 2, 4.

7. Differential Calculus.—Rules for the differentiation of functions of a single variable; successive differentiation; development of functions; maxima and minima of functions of a single variable; differentials of an arc, plane area, surface and volume of revolution; elementary discussion of higher plane curves; the spirals, logarithmic curve, trochoid, etc.; algebraic curves.

Integral Calculus. Integration of elementary forms and rational functions; rectification of plane curves; quadrature of plane areas and surfaces of revolution; cubature of solids of revolution.

Advanced Analytical Geometry. Loci in space; in point, right line, plane and surfaces of the second order.

Advanced Calculus. Development of the second state of functions of any number of variables; differential equations; maxima and minima of functions of two or more variables; construction and discussion of curves and surfaces; integration of irrational and transcendental differentials and of differential equations of the higher orders and degree; applications; elements of elliptic integrals. *Byerly's Differential Calculus; Byerly's Integral Calculus; Newcomb's Analytic Geometry. Fall, winter, and spring terms, full study.* Professor SHATTUCK.

Required: Math., 2, 4, 6.

THEORETICAL AND APPLIED MECHANICS.

1. Analytical Mechanics.—The mechanics of engineering rather than that of astronomy and physics is here considered, with a view to the future needs of the student of engineering. In addition to fixing the fundamental concepts and demonstrating the general principles of equilibrium and motion, application of principles and methods is

made to numerous and varied engineering problems in such a way that the student must discriminate in the use of data and in the statement of conditions, and so obtain a working knowledge of the subject. The methods of the calculus are used whenever preferable. As mathematical processes and forms express most readily and quickly the rules and methods of work, the training in this direction is important. This subject requires a thorough working knowledge of the mathematics preceding it in the course.

Outline of the subject: Nature and measure of force; composition and resolution of forces; moments; conditions of equilibrium; resultant of systems; of forces; center of gravity; moment of inertia; rectilinear and curvilinear motion, and the relation between such motion and the constraining and accelerating forces; dynamics of a rigid body; momentum and impact; work, energy, and power; mechanical advantage; friction. *Bowser's Analytical Mechanics. Fall term, full study.* Professor TALBOT.

Required: Math., 2, 4, 5, 6, 7.

2. Resistance of Materials.—In the treatment of this subject it is the aim to give the student a thorough training in the elementary principles of the mechanics of materials, to follow with such experiments and investigations in the testing laboratory as tend to verify the experimental laws, and to add such problems in ordinary engineering practice as will train the student in the use of his knowledge.

Outline of the subject: Elasticity of materials; stresses and strains; experimental laws; working strength for different materials; resistance of pipes and riveted joints; bending and resisting moment, shear and elastic curve of cantilever, simple, restrained, and continuous beams; column formulas; torsion, and shafts; maximum internal stresses in beams; fatigue of metals; working strength for repeated stresses; resilience; reliability of the common theory of flexure as shown by actual experiment; design and strength of rolled and built beams and columns; specifications for materials and methods of testing. *Merriman's Mechanics of Materials. Winter term, full study.* Professor TALBOT.

Required: Math., 2, 4, 6, 7; Mechanics, 1.

3. Hydraulics.—In hydraulics the instruction is by text-book and laboratory work.

The subject covers the following: Weight and pressure of water; head; center of pressure, velocity and discharge through orifices, weirs, tubes, pipes, conduits, canals, and rivers; measurement of

pressure, velocity, and discharge; motors and meters; water power. *Merriman's Hydraulics. Spring term, full study.* Professor TALBOT.

Required: Math., 2, 4, 6, 7; Mechanics, 1, 2.

General Engineering Drawing.

1. Elements of Draughting.—This term's work is designed as a general preparation for draughting in all branches. Its aim is first, to teach the accurate and intelligent use of instruments and materials; and second, to start the student upon his work with those neat and orderly habits that are invaluable to the competent draughtsman.

   The instruction is given by text-books, lectures and reference to books in the University library. The problems are arranged so as to be of the most practical benefit to the student, and, instead of being copies of similar problems, are designed to throw him upon his own ingenuity in applying his knowledge of principles learned. This work includes geometrical constructions; orthographic, isometric, and cabinet projections of objects from models or given data; sections, drawings finished in line shading and water colors; in all about thirty plates. *Lectures and Blue Prints. Fall term, full study.* Mr. McLANE.

2. Descriptive Geometry.—The first term's work in this study includes problems on the point, line, and plane, some of the simpler geometrical solids, and shades and shadows. The second term's work takes up plane, single-curved, double-curved, and warped surfaces; the generation and development of the same; sections and intersections. The application of principles and methods in numerous and varied practical problems is a large part of the work in each term, comprising in all the drawing of about thirty-five plates. *Church's Descriptive Geometry. Half of winter term, half study; spring term, full study.* Mr. McLANE.

   Required: General Engineering Drawing, 1.

3. Lettering.—Plain and ornamental alphabets; round and stump writing; titles and title pages. *Winter term, half study.* Mr. McLANE.

   Required: General Engineering Drawing, 1.

Physics.

The instruction in physics is given by means of lectures and by practice in the laboratory. The work in each course is determined to some extent by the line of study pursued by the student for whom the course is prescribed.

The department of physics has for its quarters a large lecture room provided with conveniences for lecture illustrations, such as projecting lantern, switch board, resistances, motors, etc.; also a laboratory for experimental work, a photometry room, and a photographic dark room.

The equipment consists of a line of apparatus selected from the best makers with especial reference to lecture illustrations and quantitative laboratory work. Large additions have lately been made to the apparatus in this department. The equipment of the electrical laboratory adds greatly to the facilities for the treatment of electricity in general physics.

1. Major Course.—Lectures and Laboratory Work. This course is provided for the students in the College of Engineering and is required of them; it is also open to others wishing a more complete course in physics than course 2. In this course the most important principles of dynamics are taken up first. An elementary treatment of the theory of the potential is then given, followed by a study of the most important phenomena of magnetism and electricity, the treatment of electricity and periodic motion is followed by the discussion of sound, hydrodynamics, optics, thermics, and thermodynamics. The supply of apparatus for measurements is sufficient for fifteen students working at one time on the same experiment. This makes it possible, even with very large classes, for the experimental work in the laboratory to keep pace with the lectures. The laboratory work consists entirely of quantitative measurement made under the personal supervision of the instructors, with instruments of precision. The student is required to do as accurate work as can be done with these instruments. Possible sources of errors are studied and the effects of these errors on the results discussed. The experiments, which are about thirty-five in number, are designed to give the student a practical knowledge of the principles, laws, and phenomena of physical science; they are arranged as far as possible in logical sequence. An effort is made to have each student determine for himself the relation existing between the facts which he has observed and recorded in order to stimulate him to the formation of habits of sound thinking. Reading in standard works on theoretical and experimental physics is assigned from time to time. *Fall, winter, and spring terms, full study.* Assistant Professor SHEA.

   Required: Math., 3, or 4.

2. Minor Course.—Lectures and laboratory work. This course is designed to meet the wants of those whose line of study does not require so extended a knowledge of physics as is made in course 1; the

principles taken up will require less mathematical knowledge for discussion, and the laboratory work will include problems that present fewer experimental difficulties. No attempt will be made to cover the whole ground of physics. Elementary mechanics will be taken up at the beginning of the course as a necessary introduction to the study of physics. The behavior of solids and fluids with respect to forces will be carefully discussed and then a brief treatment of magnetism and electricity will be given. *Winter term, full study.* Assistant Professor SHEA.

Required: Math., 3, or 4.

DESCRIPTIVE ASTRONOMY.

1. Descriptive Astronomy.—For students in Colleges of Agriculture, Science and Literature. The aim of this course is to supply (1) a general knowledge of the facts of astronomy, (2) a clear conception of the principles underlying them, and (3) an understanding of the methods of arriving at these facts. The subjects considered are the doctrine of the sphere, the heavenly bodies, their nature, dimensions, characteristics and the influence they exert upon each other by their attractions, radiation, or any other ascertainable cause. The most important instruments of astronomical research are explained; and during favorable weather, the sun, moon, and planets will be studied with the equatorial telescope. Methods of spectroscopic research are discussed, and, as far as possible, illustrated. Illustrative charts and lectures are also occasionally resorted to. *Newcomb and Holden's Astronomy, Advanced Course. Spring term, full study.* Assistant Professor MYERS.

Required: Math., 3.

2. Descriptive Astronomy.—For students of the College of Engineering. This course comprises the subject matter of course 1 and, in addition, some of the fundamental principles of celestial mechanics. Astronomy is here taught with a view to its utility rather than as a matter of general information. Students are required to work out problems in latitude and longitude, to deduce from the principles of mechanic's formulæ for weighing the masses of the heavenly bodies against each other, to solve problems involving corrections for parallax, refraction, dip of the horizon, and to determine mathematically the distances, dimensions, and orbits of the bodies of the solar system. When favorable weather admits, the equatorial telescope is in use by students, and time is spent in the location and study of

the constellations. Students are directed to make readings on astronomical subjects of value to be found in astronomical publications in the library, and are frequently required to recite upon them. Though no attempt is made to teach practical astronomy, which is taught as a specialty in civil engineering, the practical features of descriptive astronomy are kept uppermost in this course. *Young's General Astronomy. Spring term, full study.* Assistant Professor MYERS.

Required: Math., 4; Physics, 1; Theoretical and Applied Mechanics, 1.

MECHANICAL ENGINEERING.

1. Shop Practice A.—The course of elementary shop practice has been carefully arranged to familiarize the student with the forms of the parts of machines, and the mode of producing them. He is made familiar with all the ordinary cutting tools for iron and wood; with the form and condition for most effective work; with the machines and appliances by which they are put in action, and the instruments by which desired dimensions of product are obtained.

(*a*) Exercises preparatory to pattern making in wood, consisting of planing, chiseling, boxing, sawing, turning, etc.; pieces are combined by mortise, dovetail, and glue joints. Finally, finished patterns are made.

(*b*) Exercises in chipping and filing, in which true surfaces are produced with the cold chisel and file. After the hand and eye are sufficiently trained, fitting is begun, and the square, bevel, rule, compasses, and other auxiliary bench tools are used. Pieces are then fitted together by the file, with surfaces carefully finished.

(*c*) Blacksmithing, including such operations as drawing, upsetting, punching, welding, tempering, etc.

(*d*) Elementary exercises in machine tool work, in which the student becomes familiar with the various machine tools, such as engine lathes, shapers, planers, etc.

(*e*) Exercises in molding and casting.

(*f*) Machine tool work executed with especial reference to finish and sizes, using calipers, scales, gauges, etc. *Fall, winter, and spring terms, full study.* Mr. ANDERSON and Mr. CLARK.

2. Mechanical Drawing and Construction.—In this course the student is taught the methods peculiar to mechanical drawing. A complete set of drawings is made of some machine or parts of machines. The

time is divided between the drawing room and the machine shop. *Fall, winter, and spring terms, full study.* Mr. ANDERSON and Mr. PHILLIPS.

Required: General Engineering Drawing, 1, 2, 3.

3. Mechanism.—In this course the student takes up the parts of machines with reference to the production of required motions. The various forms of gear wheels, cams, link work, etc., are studied. Finished drawings are made, involving the more important problems. *Stahl and Woods's Principles of Mechanism. Fall term, full study.* Professor SCRIBNER.

Required: Math., 2, 4, 6; Mechanical Engineering, 1, 2.

4. (*a*) Engineering Materials.—The work of this course includes the characteristic properties of the materials used in construction, and their preparation. The nature and value of fuels for various purposes are also considered.

(*b*) Steam Engineering. This subject is preparatory to the course on heat engines. The steam engine and boiler are taken up with reference to various designs, uses to which the different kinds are best suited, action of the parts, and of steam within the engine.

(*c*) Valve Gears. This is drawing room work and consists of analysis of the simple slide valve, of cut-off valves, and common valve gears by means of diagrams. *Winter term, full study.* Professor SCRIBNER.

Required: Shop Practice A; Math., 2, 4, 6; General Engineering Drawing, 1, 2; and for (*c*) Mechanical Engineering, 1, 2, 3.

5. Mechanics of Machinery.—In this course the dimensions of the various parts of machines are computed, the problems relative to shafting, belts, etc., are also taken up. *Unwin's Machine Design. Spring term, full study.* Professor SCRIBNER.

Required: Math., 2, 4, 6; General Engineering Drawing, 1, 2, 3; Theoretical and Applied Mechanics, 1, 2; Mechanical Engineering, 1, 2, 3.

6. Heat Engines.—This course includes the problems of thermo-dynamics that arise in the consideration of steam, gas, and other heat engines. *Peabody's Thermo-Dynamics. Fall term, full study.* Professor SCRIBNER.

Required: Math., 2, 4, 6, 7; General Engineering Drawing, 1, 2, 3; Mechanical Engineering, 1, 2, 4.

7. Machine Design.—In this course there is undertaken the designing of a steam engine or other machine, the parts of which are carefully

computed and designed in accordance with the best scientific practice. *Fall and spring terms, full study.* Professor SCRIBNER.

Required: Math., 2, 4, 6, 7; General Engineering Drawing, 1, 2, 3; Theoretical and Applied Mechanics, 1, 2; Mechanical Engineering, 1, 2, 3, 4, 5.

8. Hydraulic Engines and Wind Wheels.—This is in part a study of the theory and practice of turbine and other water motors, and in part an examination of pumping and other hydraulic machinery. Some of this work is done in the drawing room. *Bodmer's Hydraulic Engines. Winter term, full study.* Professor SCRIBNER.

Required: Math., 2, 4, 6, 7; General Engineering Drawing, 1, 2, 3; Theoretical and Applied Mechanics, 1, 2, 3; Mechanical Engineering, 1, 2, 3, 4, 5.

9. Mechanical Laboratory.—The work of this course in the winter term is designed to give the student practical experience in the testing of steam engines and boilers with the apparatus used in such work; methods of transmitting power; value of lubricants; tests of gas engines, pumps, and all apparatus used in engineering practice. *Winter and spring terms, full study.* Professor SCRIBNER.

Required: Math., 2, 4, 6, 7; General Engineering Drawing, 1, 2, 3; Theoretical and Applied Mechanics, 1, 2, 3; Mechanical Engineering, 1, 2, 3, 4, 5, 6.

10. Estimates.—In this course estimates are made of the cost of power and heating plants, including the various forms of contracts and specifications. *Spring term, full study.* Professor SCRIBNER.

Required: Math., 2, 4, 6; General Engineering Drawing, 1, 2, 3; Theoretical and Applied Mechanics, 1, 2, 3; Mechanical Engineering, 1, 2, 4, 5, 7; Civil Engineering, 5.

ELECTRICAL ENGINEERING.

1. Electrical Measurements.—This course is designed to bring before the student the systems of electrical units, together with the ordinary problems of electrical measurement and measuring apparatus.

(*a*) Lectures upon the theory of instruments, electrical units, and theory of electricity.

(*b*) Laboratory work consisting of the determination of galvanometer constants, measurements of resistances by the various Wheatstone bridge methods, electro-motive force, and current measurements. *Spring term, full study.* Assistant Professor SHEA.

Required: Physics, 1.

2. Electrical Laboratory.—This course is essentially a course of laboratory work, but lectures may be given or text-book work assigned, as is thought best. It includes the measurement of high resistances, cable and line testing, measurements of capacity, the standarizing of ammeters and voltmeters, and electrometer work. The work of the course is taken up with special reference to accuracy and methods of precision. *Fall term, full study.* Mr. KUEHMSTED.

Required: Physics, 1; Electrical Engineering, 1.

3. Electro-Magnetism and Dynamo-Electric Machinery.—(*a*) Lectures and text-book work. The theory, design, and classification of dynamo-electric machines and motors is considered, together with the efficiency and methods of governing constant current and constant potential machines.

(*b*) Electrical designing and draughting, supplementing the theoretical work under (*a*). *Winter term, full study.* Mr KUEHMSTED.

Required: Electrical Engineering, 1, 2.

4. Dynamo Laboratory—Experimental study of dynamo electric machinery, determination of characteristics and other curves, regulation, etc. *Winter term, full study.* Assistant Professor SHEA and Mr. KUEHMSTED.

Required: Electrical Engineering, 1, 2.

5. Alternating Currents and Machines.—(*a*) Lectures and text-book work upon the generation and application of alternating currents, the theory of converters, and the effect of the alternating current.

(*b*) Laboratory practice, consisting of the measurement of the alternating current and testing of alternating current machines. *Spring term, full study.* Mr. KUEHMSTED.

Required: Physics, 1; Electrical Engineering, 1, 2, 3, 4.

6. The Installation of Light and Power Plants.—(*a*) Electric Lighting. This includes the methods of wiring for arc and incandescent lighting, wiring, rules and regulations, and estimates on the cost of plants.

(*b*) Electrical Distribution of Power. The distribution of power is taken up with the especial regard to the electric railway, including estimates. *Lectures and Notes. Spring term, half study.* Mr. KUEHMSTED.

Required: Electrical Engineering, 1, 3, 4.

7. Photometry.—Lectures and Laboratory Work. This includes the problems of photometry, as found in connection with arc and

incandescent electric lights. *Spring term, half study.* Assistant Professor SHEA.

Required: Physics, 1; Electrical Engineering, 1, 2, 3.

CIVIL ENGINEERING.

1. Land Surveying.—Areas and distances by chain, compass, and plane table; U. S. public land surveys, including legal points involved in the re-establishment of boundaries; magnetic variation and determination of true meridian. The students solve numerous problems in the field with instruments. To facilitate practice in surveying, an area has been specially prepared in which the difficulties of plane surveying are presented to the beginner as he is able to meet them, and where he is taught practical methods of overcoming them. All possible distances, directions, areas, and elevations are accurately known; and hence the instructor knows beforehand the precise result which the student should obtain. This is an incentive to the student and enables the teacher to show him the degree of accuracy attained, and also to point out errors. *Bellows and Hodgman's Surveyors' Manual. Fall term, full study.* Professor BALDWIN.

Required: General Engineering Drawing, 1; Math., 4.

2. Topographical Drawing and Surveying.—Topographical drawing is given during the bad weather of the winter term. The student spends about half a term making the standard topographical symbols. This and transit surveying and leveling making one credit.

During the spring term topographical surveying is taught, in which students solve problems with the plane table and the stadia, and make a topographical survey and plot the notes. *Winter and spring terms, half study.* Professor BALDWIN.

Required: Math., 4; General Engineering Drawing, 1, 2, 3; Civil Engineering, 1.

3. Transit Surveying and Leveling.—Construction, adjustment, and use of the transit and level; angles, inaccessible distances, and areas with the transit; profiles and contours with the level. Two weeks' time is given to practice in running railroad curves. The department is provided with the instruments necessary for the different branches of engineering field practice, including chains, tapes, compasses, plane tables, stadias, transits, levels, barometers, base rods, and comparing apparatus, sextants, and solar transits. These instruments are in constant use by the students whenever the weather

will permit. *Baker's Engineers' Surveying Instruments. Winter and spring terms, half study.* Professor BALDWIN.

Required: Math., 4; General Engineering Drawing, 1, 2, 3; Civil Engineering, 1.

4. Railroad Engineering.—In the field practice, the class makes preliminary and location surveys of a line of railroad of sufficient length to secure familiarity with the methods of actual practice. Each student makes a complete set of notes, maps, profiles, calculations, and estimates. In addition to the mathematical theory of curves, turnouts, crossings, and the calculations of earth work, instruction is given by means of text-books and lectures on the principles of economic location, particularly the effect of distance, grade, and curve upon operation and maintenance, and of methods of construction, equipment, and maintenance of way. *Godwin's Railroad Engineers' Field-Book. Fall term, full study; Winter term, with Municipal Sanitary Engineering, 1, makes a full study.* Professor TALBOT.

Required: Math., 4; General Engineering Drawing, 1, 2; Civil Engineering, 1, 2, 3.

5. Masonry Construction.—Requirements and methods of testing stone, brick, cement, and lime; composition, preparation, and strength of mortar and concrete; classification, construction, strength, cost of stone and brick masonry; foundations under water; theory of stability; cost, etc., of dams, retaining walls, bridge piers, bridge abutments, culverts, and arches. The students have experiments in the testing laboratory, in testing cement. mortar, stone, and brick. *Baker's Masonry Construction. Fall term, full study.* Professor BAKER

Required: Math., 2, 4, 6, 7; Theoretical and Applied Mechanics, 1, 2; General Engineering Drawing, 1, 2.

6. Geodesy.—Geodesy is taught by lectures and assigned reading. Studies are made of the instruments and methods employed in spirit, barometrical, and trigonometrical leveling; the apparatus and methods used in measuring base lines; the location and construction of stations; the method of measuring the angles and reducing the triangulation; the principles of projecting maps; the methods employed in running parallels and meridians. The apparatus consists of a 12-inch alt-azimuth instrument reading to single seconds, a precise level, aneroid and mercurial barometers, three wooden base rods, a comparator, a steel tape with level, thermometer, and spring

balance. Problems are solved in barometrical, trigonometrical, an precise leveling, and in reading horizontal angles. *Fall term, half study.* Professor BAKER.

Required: Math., 4; General Engineering Drawing, 1, 2, 3; Civil Engineering, 1, 3; Descriptive Astronomy, 2.

7. Practical Astronomy.—Is given by lectures, recitations, and practice. The object is to familiarize the students with those principles of practical astronomy employed in extended surveying operations, and also to train the student in methods of exact observations. The apparatus consists of an observatory with three isolated stone piers; a 12-inch alt-azimuth intrument reading by micrometers to single seconds, both of altitude and azimuth; an astronomical transit; three chronometers; two sextants; two solar transits; and a set of meteorological instruments. The problems include the adjustments of all the instruments, and the determination of time, latitude, and azimuth by the several methods. *Loomis's Practical Astronomy. Fall term, half study.* Professor BAKER.

Required: Math. 4; General Engineering Drawing, 1, 2, 3; Civil Engineering, 1, 3; Descriptive Astronomy, 2.

8. Bridges.—The instruction in bridges occupies two terms. The first —bridge analysis—is devoted to the calculations of the strains in the various forms of bridge trusses, by algebraic and graphical methods, consideration being given to weights of bridge and train, and force of wind. The second—bridge design—is devoted to designing bridges, proportioning sections, and working out of details. Each student designs and makes a full set of drawings of a bridge. The apparatus consists of a series of full sized joints and connections of a modern iron railroad bridge, numerous models of bridges, a large collection of drawings, photographs, and lithographs of bridges. *DuBois's Strains in Framed Structures. Winter and spring terms, full study.* Professor BAKER.

Required: Theoretical and Applied Mechanics, 1, 2; Architecture, 6.

9. Tunneling.—This course, treating of methods of tunneling and mine attack, is given to students of civil engineering. The lectures treat first of the nature and use of explosives, compressed air and power drills. The methods of tunneling are then explained and discussed with their accompanying methods of timbering and walling. Attention is given to the sinking of shafts for the working of tunnels, or for the purposes of driving. The details of the duties of a tunnel

engineer are made as clear and concise as possible. Some time is given in the earlier part of the course to the practice in hydraulics, boring wells, dredging, and quarrying. *Spring term, full study.* Professor BALDWIN.

Required: Math., 2, 4, 6; General Engineering Drawing, 1, 2; Shop Practice A; Mechanical Engineering, 4; Chemistry, 1; Physics, 1.

10. Surveying.—For students in the courses of architecture, architectural engineering, and mechanical engineering. Areas with chain and compass; U. S. public land surveys, and principles of re-establishing corners; use of transit in finding distances, areas, and in laying out buildings; use of the level in finding profiles and contours. *Baker's Engineers' Surveying Instruments. Spring term, full study.* Professor BAKER.

Required: Math., 4; General Engineering Drawing, 1, 3; Physics, 1.

MUNICIPAL ENGINEERING.

1. Road Engineering.—Instruction is given by means of text-books and lectures. In country highways the value and importance of road improvement and the best means of securing it are considered, together with the principles and details of construction of earth, gravel, and macadam roads. In city streets, the methods of construction, cost, durability, and desirability of the various kinds of pavement, and the question of grades, cross sections, methods of assessment of cost, and methods of maintenance and cleaning are treated. *Gilmore's Roads, Streets, and Pavements; Lectures and Reading. Winter term, with Civil Engineering, 4, makes a full study.* Professor TALBOT.

Required: Math., 4; General Engineering Drawing, 1, 2; Civil Engineering, 1, 2, 3, 4.

2. Water Supply Engineering.—This subject is intended to cover the principal features of the construction of water-works, including the tests and standards of purity of potable water; the choice of source of supply; the designing of the distribution system, pumps and pumping machinery, reservoirs, stand-pipes, and the filtration of water. *Lectures; Fanning's Water Supply Engineering. Fall term, full study.* Professor TALBOT.

Required: Theoretical and Applied Mechanics, 1, 3; Chemistry, 1; Mechanical Engineering, 4 (*b*).

3. Sewerage.—The design and methods of construction of sewerage systems for cities, including the following: sanitary necessity of sewerage; water carriage systems, both separate and combined; surveys and general plans; hydraulics of sewers; relation of rainfall to storm water flow, and determination of size and capacity of sewers; house sewage and its removal; form, size, design, and construction of sewers and sewer appurtenances; modern methods of sewage disposal by filtration, chemical precipitation, irrigation, etc., with resultant changes in the sewage; estimates and specifications. *Lectures; Staley and Pierson's Separate System of Sewerage. Winter term, full study.* Professor TALBOT.

Required: Theoretical and Applied Mechanics, 1, 3; Chemistry, 1.

4. Botany.—This is a study of the lowest orders of plants, including such species as are most commonly met with in microscopical examinations of water, and found associated with putrescent substances. Lectures or recitations and microscopical laboratory work. This is practically the same as the first part of the second term of botany 1, in College of Science. *Winter term, half study.* Professor BURRILL.

5. Bacteriology.—For students in course in municipal engineering. This course includes the identification and classification of bacteria, and of allied organisms, their relations to health and to disease, the methods of separation and cultivation, and the methods of air and water analysis. The laboratory is furnished with sterilizers, culture ovens, microscopes, etc.; and students have abundant opportunity to do practical work. This is at first the same as bacteriology 1, in the College of Science, but in the latter part of the term special investigations are undertaken by the engineering students. *Fall term, full study.* Professor BURRILL.

Required: Municipal and Sanitary Engineering, 4.

MINING ENGINEERING.

1. Mine attack.—This includes the means and methods of attack, and the transportation of products to the surface, as follows: (1) tools, implements, machinery, explosives, stripping, boring, sinking, drifting, etc.; (2) timbering; (3) haulage; (4) hoisting; (5) ventilation; (6) drainage. There are coal mining districts within easy reach, and the mine managers offer to students every facility for visiting and inspecting the mines.

Diagrams, charts, models, and full sized tools and machines in possession of the University, are used in illustrating the lectures. *Fall term, full study.* Professor BALDWIN.

Required: Math., 4; Chemistry, 1, 6; Physics, 1.

2. Mine Surveying.—Instruction is given by lectures and recitations, and includes the use of the solar compass, solar attachments, practice of the U. S. deputy surveyors, traverse survey with inclined measurements, connection of surveys above and below ground, and the determination of the position of bore holes, drifts, and shafts from data given or acquired by the students. The field work is carried along with the lectures. The University has three transit instruments especially adapted for underground work. The field work is under the personal supervision of the instructor, and all checks are made by the students, as in regular surveys. Complete plats, maps, drawings and calculations are required for all field work.

Surveying in the mines for two weeks at the end of the term familiarizes the students with the peculiar features and difficulties of underground practice. *Spring term, full study.* Professor BALDWIN.

Required: Math., 4; General Engineering Drawing, 1, 3; Civil Engineering, 1, 2, 3.

3. Ore Dressing.—The fall term is devoted to ore dressing, and the course comprises lectures upon properties of ores in respect to subsequent treatment; theory of jigging and treatment of slimes; hand dressing; machine crushing, crushers, rolls, stamp mills, and pulverizers, etc.; sizing machinery, classifiers, and separators, etc.; sorting machinery; comparative economy and efficiency of different methods of treatment; typical dressing works. During the entire course the the students work in the laboratory, making mill and experimental tests upon a large scale. The laboratory is equipped for this purpose with a Dodge crusher, a pair of Cornish rolls, elevators with deflecting spouts, automatic sampler, sizing screens, jigs, hydraulic separator and rotating table. There is also a chlorine generator with tanks and vats. The machines are all of regular working size, driven with gearing by a steam engine, and worked in accordance with the practice of milling and testing laboratories. A complete series of assays is made of the products from each machine, and schemes of treatment and the speeding of the machine are worked out from the data. *Fall term, full study.* Professor BALDWIN.

Required: Chemistry, 1, 6; Physics, 1; Mining Engineering, 1, 2.

4. Mine Engineering.—Two terms are devoted mainly to the technical and professional branches of mining. The exploration, development and exploitation of mines are considered at length. The complications which arise are specially brought out from the study of typical mines. Instruction in mine management and mine accounts is given. Calculations and designs from actual data are required from the students. The operation of machines and apparatus, ventilation, etc., are explained in accordance with the principles underlying them, as well as from the standpoint of practice. *Fall, winter, and spring terms, full study.* Professor BALDWIN.

Required: Chemistry, 1, 6; Physics, 1; Mine Engineering, 1, 2, 3.

ARCHITECTURE.

1. Shop Practice B.—To give a practical knowledge of various kinds of work, three terms are devoted to a course of instruction which all architectural students are required to pursue, unless they have previously had equivalent practice and obtained credit therefor.

First Term.—Carpentry and Joinery. Planing flat, square, and octagonal prisms and cylinders; framing with single, double, and oblique tenons; splices, straight and scarfed; miter, lap, and gained joints; through and lap dovetails; moldings, miters, miter-box, and panels.

Second Term.—Turning and Cabinet Making. Glue joints; moldings; inlaying; ornamental veneering; turning cylinders, balusters, ornamental forms, capitals, rosettes, vases, etc.

Third Term.—Construction of portions of buildings or of complete architectural structures at a reduced scale; roof trusses, stairs, frames of wooden buildings, etc., made from drawings. *Fall, winter, and spring terms, full study.* Mr. PARKER.

2. General Architectural Construction.—(*a*) Wood Construction. Formulæ and data for computing the dimensions and strengths of columns, rods, beams, girders, etc., of wood or metal are first given and then applied in the solution of numerous examples. The kinds of wood and their uses in construction and decoration, their seasoning, shrinkage, defects, and modes of protection from decay, are next studied. The construction and design of wooden floors, walls, ceilings, and roofs are then treated, and afterwards, joinery, comprising doors, windows, bays, inside finish, cornices, wainscoting, etc. The

construction and design of stairs of the various types terminate the work of the term. About twenty problems are worked out on as many plates by the student.

(*b*) Stone, Brick, and Metal Construction. Foundations of stone, brick, concrete, and on piles, are first studied. Then the materials employed in stone masonry, their uses, defects, qualities, and mode of preparation. Kinds of masonry and external finish. Tools and methods of stone cutting. The preparation of working drawings is illustrated by practical applications in the study of the arch, the vault, and the dome. Brick masonry is next examined, with its materials and bonds, and several examples are drawn. The manufacture and refining of cast-iron, wrought-iron, and steel are then studied, together with the processes of pattern making, molding, casting, refining, rolling, etc., as well as the stock or standard dimensions or sections to be obtained in the market. The special properties and value of each metal in a structure, the designing of a line of columns in a tall mercantile building, and of beams and girders, together with the study of joints and connections completes the work of the term. About twelve problems are drawn on the same number of plates. *Ricker's Wood, Stone, Brick, and Metal Construction; Macfarlane's Elementary Mathematical Tables. Fall and winter terms, full study.* Mr. WHITE.

Required: Shop Practice B; General Engineering Drawing, 1, 2, 3.

3. Sanitary Construction.—Daily recitations or special lectures, with designs for special problems. The study of plumbing, trap ventilation, removal of wastes, construction of water closets, drains and systems of water supply; sewage disposal. Hot water supply and fixtures in dwellings. *Gerhard's Drainage and Sewerage of Dwellings; Lectures on Sewage Disposal; Dye's Hot Water Supply. Spring term, full study.* Mr. WHITE.

Required: Math., 4; Shop Practice B; Physics, 1.

4. Architectural Drawing.—(*a*) The subjects of instruction are the different methods of finishing architectural drawings in line and washes, the use of the orders, and the study of shades and shadows, these being combined to produce the greatest benefit, so far as possible. Penciling, inking, washing, and tinting drawings are practiced, as well as obtaining cast shades and shadows. The single plane method is preferred for this purpose, and is found applicable to most cases. The orders are drawn in plan and elevation, as well as superposed, and the shades and shadows are found on a capital and base, drawn

at large scale. Drawings are finished in ink, ink wash, sepia, and various tints. Lectures and special instruction in shades and shadows.

(*b*) The second term is devoted to instruction in the office style of preparing working drawings for a given building. Rough figured sketches are furnished to the student, from which each student makes a set of general and detail drawings in pencil on opaque paper. These are then traced in ink on transparent paper or linen and colored to indicate materials. Especial care is taken to secure neat lettering and accurately figured dimensions. Personal instruction to each member of the class. *Vignola's Five Orders. Fall and winter terms, full study.* Mr. White.

Required: General Engineering Drawing, 1, 2, 3; Architecture, 2.

5. History of Architecture.—Two terms' work, usually divided at the beginning of the Romanesque style. Commencing with the Egyptian and ending with the Renaissance, a careful study is made of each of the more important styles, successively examining the historical conditions, the local and inherited influences, the structural materials and system, the special ornaments, and the purposes and designs of the buildings, with an examination of a few of the most important typical examples of the styles. Especial attention is given to any ideas that might be useful or suggestive in American work, and to tracing the gradual evolution of architectural forms. This study therefore becomes a very interesting branch of the history of human civilization. References are made to numerous works, especially to Fergusson, Lubke, Durm, Reber, Gailhabaud, etc. *Ricker's Notes on History of Architecture; Goodyear's History of Art. Winter and spring terms, full study.* Professor Ricker.

Required: Architecture, 2, 3, 4 (*a*).

6. Roofs.—This term is devoted to the elements of graphic statics, and to the applications of the science in the designing of trussed roofs. The composition and resolution of forces, equilibrium, reactions, moments, bending moments, and shears on beams, center of gravity and moment of inertia of any form of cross sections, are first examined. The construction of wooden and of metallic roofs is next studied, then the mode of computing permanent and temporary loads on roof trusses, of obtaining end reactions, of drawing strain diagrams, determining sectional dimensions of members, and ending with the designing of joint connections. Numerous problems are solved, five different types of trusses are usually worked out,

complete designs and details being made for one of wood and another of iron or steel. *Ricker's Trussed Roofs. Spring term, full study.* Mr. WHITE.

Required: Math., 2, 4, 6, 7; Theoretical and Applied Mechanics, 1, 2; Architecture, 2, 3, 4 (except for students in civil, municipal, and mining engineering courses).

7. Architectural Perspective.—The theory of perspective is taught, with all labor saving methods of abbreviating the labor, and designing in perspective itself is made a special aim, this power being very useful to a draughtsman in preparing sketches for clients. Methods of diagonals, by triangles, and by coördinates are all used. Problems in angular, parallel, vertical, and curlvilinear perspective, as well as in perspective shades and shadows, are solved, requiring original work as far as possible, so as thoroughly to prepare the student for any kind of work in perspective, instead of restricting him to the study and use of a single system. Six problems are worked out on as many plates. *Ware's Modern Perspective. Fall term, full study.* Mr. WHITE.

Required: Architecture, 2, 3, 4.

8. Superintendence, Estimates, and Specifications.—This study comprises several specialties in office work, not otherwise provided for, so far as they can be taught in a professional school. One-third the time is devoted to superintendence, one-half to estimates, and the remainder to specifications, contracts, etc.

Clarke's Building Superintendence is carefully read with daily recitations.

In estimates the purpose of the instruction it to impart a knowledge of the usual methods of measurement of materials and work, the arrangement of computations in proper and convenient orders, and an acquaintance with approximate prices of materials and labor, which vary in different localities. The methods of squaring, cubing, of units, and of quantities, are each employed and illustrated by numerous examples.

In specifications, practice is obtained by writing out a complete set for a house, drawings for which have been previously made by the student.

Groves's Specification Blanks are employed.

The standard *Contract of the American Institute of Architects* is used, being first carefully studied, then filled out for the same house.

Bids, certificates, etc., are also prepared. *Ricker's Notes on Estimates; Wohlgemuth's Ready Reckoner. Fall term, full study.* Professor RICKER.

Required: Architecture, 2, 3, 4, 5.

9. Advanced Graphics.—This continues the study of graphic statics, commenced in roofs, with applications to metallic roofs of wide spans, roof trusses, of curved or arched form, and those supported by abutments and also jointed. Continuous girders are also examined, with the effect of moving loads on girders, the instruction ending with the graphical analysis of the arch, vault, and dome, and of the Gothic system of vault and buttress. Instruction is imparted by special lectures, and applications are made to a series of problems in designs for specified cases. References to *Planat's Mecanique Applique; Landsberg's Statik; DuBois and Clarke's Graphical Statics; Levy's Statique Graphique* (*Last Ed.*). *Fall term, full study.* Professor RICKER.

Required: Math., 2, 4, 6, 7; Theoretical and Applied Mechanics, 1, 2; Architecture, 2, 4, 6.

10. Heating and Ventilation.—A full knowledge of the scientific theory and of the practice of warming and ventilating buildings is the purpose of this study. Commencing with the fuels and the production of heat, the student passes to the flow of gases though ajutages and pipes, applying these data to the calculation of the dimensions of air ducts and chimneys. The different systems of heating by furnaces, hot water, steam, etc., are next examined, with the details of each. The sources of impurity in the air and the requirements of good ventilation are then considered, with the different methods of ventilation by aspiration, by fans, etc., ending with the study of fans of different types. Numerous problems are given. *Ricker's Abridged Translation of Planat's Chauffage et Ventilation. Winter term, full study.* Professor RICKER.

Required: Math., 4; Architecture, 2, 3, 4, 8; Physics, 1; Chemistry, 1.

11. Architectural Designing.—(*a*) Since students often find considerable difficulty when commencing to express their ideas in designs, several simple problems are first given, such as a tower, a store with flats over it, a small library, etc., usually five being studied during the term. Each student makes sketches at small scale, which are criticised and modified until approved, then worked out in plans,

elevations, and details, one elevation being washed to show color or shade effects. The object is to obtain as much practice in original design as possible, and in the making of rapid and effective sketches, suitable for submission to a client or employer.

(*b*) Further practice in design and the study of the requirements of dwellings of moderate size are the objects of the study. Several typical plans are selected as bases, and numerous changes suggested, which usually produce radical changes in the design. The student is also encouraged to make working drawings for actual clients, criticisms and suggestions being freely made to him. The work is limited to residences, since this class of buildings is likely to afford the graduate his first opportunity for independent original work, and practice in satisfying their requirements is considered to be more valuable than the study of theoretical or impossible problems. The designing of a convenient, attractive dwelling, to cost a limited amount, is really a quite difficult problem, requiring more time and thought than any other building of equal cost *Gibson's Convenient Houses. Winter and spring terms, full study.* Professor RICKER.

Required: Architecture, 2, 3, 4.

12. Esthetics of Architecture.—Subject, the laws of correct design, so far as these may be formulated in words, illustrated by the study of numerous examples. Commences with the study of the nature and mode of working of the different materials used in structural and ornamental purposes, deducing the proper ornamental treatment for each, then taking up the proper decoration of walls, ceilings, and roofs. The general principles of ornamentation are next stated, as applied to flat surfaces and to solids of various shapes. A full study of the various materials used in furniture, art works, etc., is then made, with suggestions of their proper use in the art industries. About twenty problems in original design are worked out on as many plates. *Ricker's (abridged) Translation of Redtenbacher's Architiktonik: Mayeux Decorative Composition. Spring term, full study.* Professor RICKER.

Required: Architecture, 2, 3, 4, 5, 7, 13.

13. Architect's Course in Artistic Drawing and Modeling. For second year students.

First term. Principles of free hand drawing and light and shade learned from drawing geometric solids (*a*) in outline; (*b*) in washes of water color; (*c*) in values of charcoal.

Second term. Principles applied by drawing (*a*) groups of common objects, as books, vases, chairs, tables, etc.; (*b*) casts of ornament; (*c*) interiors, as the corner of the room; (*d*) plants and flowers from nature. Special attention is given the work from casts and interiors.

Third term. Rendering perspectives in washes of water color (sepia). Sketching from nature.

Lectures are given throughout the year on design and the historic styles of ornament. Students are required to prepare (*a*) a monograph of the ancient, mediæval, or modern styles; (*b*) original exercises showing principles and methods; (*c*) original exercises employing color.

Lectures on perspective are given the second term, and the problems then worked out are illustrated by sketches from nature and made during the third term.

Instruction in pen etching is given throughout the year, but most of the work must be done out of hours. *Gregg's Architectural Rendering in Pen and Ink. Fall, winter, and spring terms, full study.* Professor FREDERICK.

Required: Elements of Draughting.

14. Architect's Course in Artistic Drawing and Modeling. For fourth year students.

First term. Modeling in clay (*a*) details of human face; (*b*) copy of cast of ornament; (*c*) ornament from photograph. Casts are made of (*a*) at least one modeled piece; (*b*) arm, hand, or foot from nature; (*c*) foliage, fruit, or vegetable from nature. One original design required.

Second term. Study of color as a means of exterior and interior decoration, at least one color scheme to be worked out, full size, in tempera colors. In place of this a second term of modeling can be taken.

Third term. Work in water colors, groups, flowers, and perspectives, or sketching from the antique and life. Sketching from nature in color. *Fall, winter, and spring terms. Full study.* Professor FREDERICK.

Required: Architecture, 13.

ADDITIONAL SUBJECTS.

The following subjects, offered to students in the College of Engineering, are described elsewhere as noted:

In College of Science—

Chemistry, 1, 2, 3, and 6; Mineralogy, 1; Geology, 1, 3; Metallurgy, 1.

In College of Literature—

French, 4; German, 4; English, 1, 2; Themes and Elocution, 1; Constitutional History, 3; Political Economy, 1.

In School of Military Science—

Drill Regulations for Infantry, 1; Drill Practice, 2.

School of Art and Design—

Free Hand Drawing, 5.

MECHANICAL ENGINEERING.

This course is designed to prepare students for the profession of mechanical engineering. It aims to fit them to invent, design, construct, and manage machinery for any branch of manufactures. There is a great demand for men, who, to a thorough knowledge of the principles of machinery and of the various motors, add the practical skill necessary to design and construct the machines by which these motors are made to work.

Instruction.

The instruction, while severely scientific, is thoroughly practical. It aims at a clear understanding and mastery of all mechanical principles and devices. Practice in the workshop is required as one of the studies of the course.

In principles instruction is imparted by lectures, illustrated plates, and text books. Examples are given, showing the application of the theories and principles taught. Experiments in the testing of machines and motors are undertaken by the student.

In practice elementary forms are produced and projects are executed, in which the student constructs machines, or parts thereof, of his own designing, and from his own working drawings.

In designing the student begins with elements and proceeds with progressive exercises till he is able to design and represent complete machines.

Equipment.

The provisions for shop instruction consist of a large, well lighted machine shop, a pattern shop, a blacksmith shop, and a foundry.

The machine shop is supplied with twelve first-class engine lathes, ranging from twelve- to twenty-four-inch swing, ten hand lathes, two

shapers, a planer, two milling machines, three drill presses, one punching machine, a Brown & Sharpe universal grinding machine, sixteen vises and the corresponding sets of bench tools. This shop is also provided with complete sets of standard gauges, reamers, arbors, drillers, etc.

The pattern shop is provided with thirty-two benches, each supplied with a case of wood-working tools.

The blacksmith shop contains sixteen forges, fitted with power blast, sixteen anvils and sets of blacksmith tools.

The foundry is equipped with a cupola for melting iron, the necessary sand, ladles, flasks, etc., for making the castings which are afterward to be used in the machine shop.

The laboratory is also supplied with dynamometers, friction brakes, calorimeters, steam engine indicators, and other apparatus for carrying on mechanical laboratory work. A 50-horse power high speed engine, made by the students in the machine shop, furnishes power and is available for testing purposes. Three other steam engines, a gas engine, and several boilers of different makes furnish ample material for testing by the students in this department.

Course in Mechanical Engineering.

FIRST YEAR.

1. Advanced Algebra; Elements of Draughting; Shop Practice; French, German, or English; Military.
2. Trigonometry; Descriptive Geometry and Lettering; Shop Practice; French, German, or English; Military.
3. Analytical Geometry; Advanced Descriptive Geometry; Shop Practice; French, German, or English; Military.

SECOND YEAR.

1. Differential Calculus; Mechanical Drawing and Construction; Physics; Military.
2. Advanced Analytical Geometry; Mechanical Drawing and Construction; Physics; Military.
3. Integral Calculus; Mechanical Drawing and Construction; Physics; Military.

THIRD YEAR.

1. Analytical Mechanics; Mechanism; Chemistry; Themes and Elocution.
2. Resistance of Materials; Engineering Materials; Chemistry; Themes and Elocution.
3. Hydraulics; Mechanics of Machinery; Electrical Measurements, or Surveying; Themes and Elocution.

MODERN MACHINE SHOP EQUIPMENT

SLOPE AT JUNEAU MINE

ONE OF THE LARGE TURBO-GENERATORS AT JUNEAU POWER PLANT

STEEL ENGINEERING EXPERIMENTS

FOURTH YEAR.

1. Heat Engines; Machine Design; Masonry Construction.
2. Hydraulic Engines and Wind Wheels; Mechanical Laboratory; Dynamo Electrical Machines; Thesis.
3. Estimates; Mechanical Laboratory; Mechanical Design; Thesis.

ELECTRICAL ENGINEERING.

The course is intended to give young men the best possible preparation for work in the practical applications of electricity. Instruction is given by lectures and laboratory practice. The student is encouraged to add to his general intellectual culture by systematic reading of the best periodical literature in theoretical and applied electricity. By keeping himself informed about the best efforts of others in every department of his profession it is hoped that he may be stimulated to independent and original investigation in his own field. To this end a department reading room at all times accessible to students in this course has been recently established, where the leading journals of general physics and applied electricity are kept on file. The instructors and students meet weekly to discuss the leading articles in these journals. A critical discussion of one or more papers is required from each student.

The electrical laboratory occupies a large room on the ground floor, fitted with masonry piers for the more sensitive instruments, and cases for apparatus. In this room the work relating to the measurement of current, resistance, electro-motor force, the standardizing of measurement aparatus, etc., is carried on.

In addition to this are a photometry room, fitted out with a Queen & Co.'s complete electric light photometer and intended especially for photometric work in connection with electric lighting; a battery room containing a large storage battery and a collection of all the leading primary cells which are used for current and testing purposes; a dynamo room supplied with power from a fifteen-horse power gas engine and sixty-horse power, high speed steam engine, both of which are used exclusively for this department and experimental work. In this room are to be found the leading types of dynamos and motors with conveniences for illustrating and testing them. A complete Thomson-Houston alternating plant and a 6000-watt Edison dynamo have lately been added to the equipment of this room.

Adjacent to the dynamo room is a workshop supplied with power from an electric motor. The shop is supplied with an engine lathe and a line of fine tools suited to the manufacture of special apparatus.

Equipment.—The electrical laboratory has been supplied with apparatus from the leading makers at home and abroad. There are several forms of the Wheatstone bridge, resistance boxes, including an Anthony 100,000-ohm box, and a Nalder Bros. subdivided megohm box, an assortment of switches, keys, condensers, and the leading forms of deadbeat and ballistic galvanometers, including a Thompson high resistance, and an Edelman deadbeat galvanometer; also several D'Arsonval galvanometers, and numerous others. Several reading telescopes are used in connection with the galvanometers. The laboratory is also supplied with certified standards of resistance, standard cells, Kelvin's current balances, ammeters, voltmeters, and watt-meters. Current is brought to the room from the dynamo and battery rooms. At present a very large addition to the collection of fine testing instruments is making.

Course in Electrical Engineering.

FIRST YEAR.

1. Advanced Algebra; Elements of Draughting; Shop Practice; French, German, or English; Military.
2. Trigonometry; Descriptive Geometry and Lettering; Shop Practice; French, German, or English; Military.
3. Analytical Geometry; Advanced Descriptive Geometry; Shop Practice; French, German, or English; Military.

SECOND YEAR.

1. Differential Calculus; Mechanical Drawing and Construction; Physics; Military.
2. Advanced Analytical Geometry; Mechanical Drawing and Construction; Physics; Military.
3. Integral Calculus; Mechanical Drawing and Construction; Physics; Military.

THIRD YEAR.

1. Analytical Mechanics; Mechanism; Chemistry; Themes and Elocution.
2. Resistance of Materials; Engineering Materials; Chemistry; Themes and Elocution.
3. Hydraulics (one-half term); Chemistry (one-half term); Mechanics of Machinery; Electrical Measurements; Themes and Elocution.

FOURTH YEAR.

1. Machine Design; Heat Engines; Electrical Laboratory.
2. Hydraulic Engines; Dynamo-Electrical Machines; Dynamo Laboratory; Thesis.
3. Installation of Light and Power Plants and Photometry; Alternating Currents and Machines; Political Economy, or Astronomy; Thesis.

CIVIL ENGINEERING.

The design is to furnish a course of theoretical instruction, accompanied and illustrated by a large amount of practice, which will enable the student to enter intelligently upon the various and important duties of the civil engineer.

Instruction.

While the instruction aims to be practical by giving the student information and practice directly applicable in his future professional work, the prime object is the development of the mental faculties. The power to acquire information and the ability to use it, is held to be of far greater value than any amount of so-called practical acquirements. The method of instruction consists in coupling the development of intellectual power with the acquisition of information directly useful to the civil engineer in his profession.

The instruction is given by lectures, text-books, and reading, to which are added numerous problems and practical exercises, as will serve best to explain principles completely and fix them in the mind. Models and instruments are continually used, both in lectures and by the students.

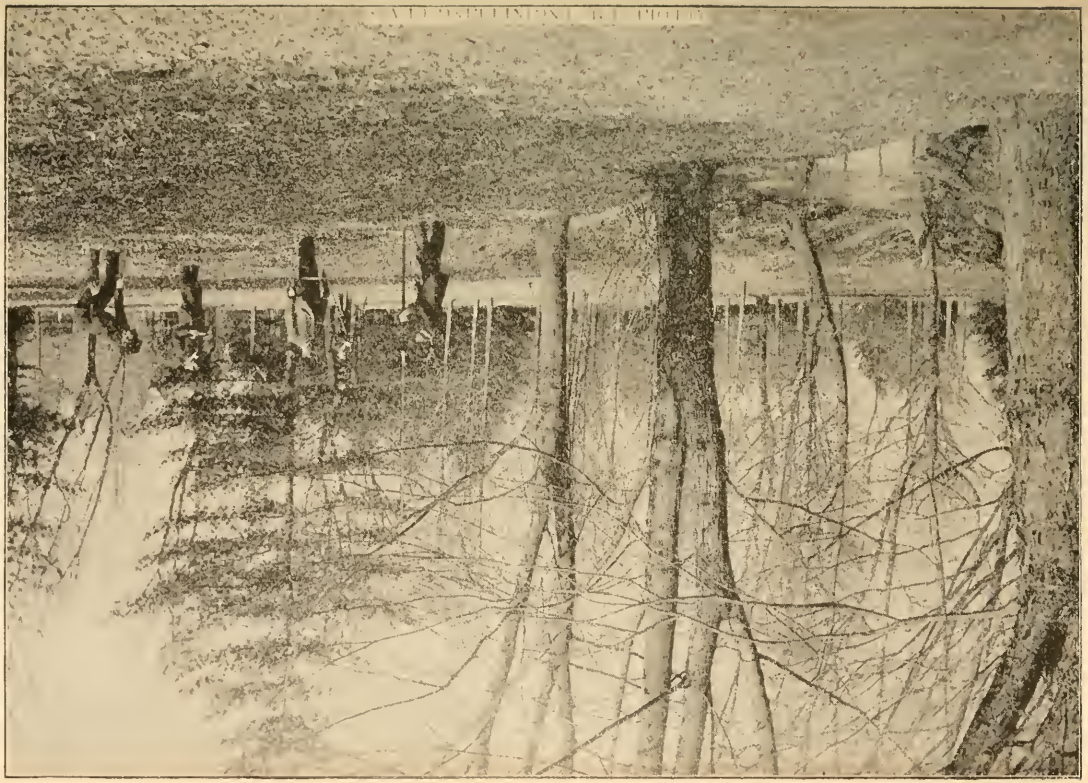
Course of Study.

The complete course occupies four years. The several subjects included therein are shown in the list below. Each study requires five recitations per week and should receive daily from three to four hours of the student's time. Some of the class exercises occupy one hour daily, while others require two hours; as a rule the latter require less time for preparation. The order of studies as given by the year and term in the tabular view of the course, should be closely followed to avoid interference in hours of recitation, and because the studies are there given in the order which best meets the preparation of the student.

Course in Civil Engineering.

FIRST YEAR.

1. Advanced Algebra; Elements of Draughting; Shop Practice; French, German, or English; Military.
2. Trigonometry; Descriptive Geometry and Lettering; Shop Practice; French, German, or English; Military.
3. Analytical Geometry; Advanced Descriptive Geometry; Shop Practice; French, German, or English; Military.



SECOND YEAR.

1. Differential Calculus; Land Surveying; Physics; Military.
2. Advanced Analytical Geometry; Topographical Drawing and Transit Surveying and Leveling; Physics; Military.
3. Integral Calculus; Topographical Surveying; Physics; Military.

THIRD YEAR.

1. Analytical Mechanics; Railroad Engineering; Chemistry; Themes and Elocution.
2. Resistance of Materials, Railroad and Road Engineering; Engineering Materials; Themes and Elocution.
3. Hydraulics; Astronomy; Roofs; Themes and Elocution.

FOURTH YEAR.

1. Masonry Construction; Geodesy and Practical Astronomy; Water Supply Engineering.
2. Bridge Analysis; Sewerage; Geology; Thesis.
3. Bridge Designing; Tunneling; Political Economy; Thesis.

MUNICIPAL AND SANITARY ENGINEERING.

This course is a modification of the civil engineering course and is designed for students intending to make a specialty of city engineering work. It includes the study of chemistry and bacteriology necessary to a comprehension of the questions involved in water supply aud sewage disposal.

Course in Municipal and Sanitary Engineering.

FIRST YEAR.

1. Advanced Algebra; Elements of Draughting; Shop Practice; French, German, or English; Military.
2. Trigonometry; Descriptive Geometry and Lettering; Shop Practice; French, German, or English; Military.
3. Analytical Geometry; Advanced Descriptive Geometry; Shop Practice; French, German, or English; Military.

SECOND YEAR.

1. Differential Calculus; Land Surveying; Physics; Military.
2. Advanced Analytical Geometry; Topographical Drawing, and Transit Surveying and Leveling; Physics; Military.
3. Integral Calculus; Topographical Surveying; Physics; Military.

THIRD YEAR.

1. Railroad Engineering; Analytical Mechanics; Chemistry; Themes and Elocution.

2. Railroad and Road Engineering; Resistance of Materials; Botany, one-half term; Steam Engineering, one-half term; Themes and Elocution.
3. Roofs; Hydraulics; Electrical Measurements; Themes and Elocution.

FOURTH YEAR.

1. Water Supply Engineering; Masonry Construction; Bacteriology.
2. Sewerage; Bridge Analysis; Chemistry.
3. Tunneling; Bridge Designing; Chemistry.

MINING ENGINEERING.

This course has been provided to meet the growing demand of a very important industry, the subjects of which are the discovery, opening, economical working and proper ventilation of mines; the prevention of accidents; transportation above and below ground; treatment of products; with many others which fall within the scope of the mining engineer. It is important that a broad basis be laid by way of general preparation for the more technical studies here included. Whatever of general culture the student may obtain before entering the University, will not come amiss, and, although the requirement is not made, it is advised that all who can do so should acquire a reading knowledge of French or German before beginning this course.

The course comprises the greater part of the pure and applied mathematics of the courses in mechanical and civil engineering. Much time is devoted to chemistry and geology, with the addition of metallurgy and other technical studies peculiar to mining engineering.

Students who are graduated from this course are not supposed to be familiar with all the details of mine management from actual experience; but they will have obtained such a knowledge of the principles underlying all successful practice, and such a familiarity with the science of mining in all its branches, that the art may be acquired with the minimum of practice.

Instruction.

Lectures are given when desirable, but these are to be regarded as supplementary to other modes of instruction which are made to conform as closely as possible to the routine of the engineer in practice. In every detail the student is made to feel that he is dealing with the actual problems which he will meet in his professional work.

Plans, estimates, drawings, reports, and calculations, based upon data obtained in the student's own experience, are constantly required,

and no pains is spared to familiarize each member of the class with duties and responsibilities of every grade, from miner to manager.

Course of Study.

In the first two years the work is similar to that required in the course in civil engineering, but more time is given to chemistry. In the third year geology and mine engineering, with assaying and metallurgy, take the place of special technical studies in the other engineering courses. In the fourth year strictly technical studies are continued, with others taken with the mechanical engineers, and with some of a more general character.

Mining Engineering Course.

FIRST YEAR.

1. Advanced Algebra; Elements of Draughting; Chemistry; French, German, or English; Military.
2. Trigonometry; Descriptive Geometry and Lettering; Chemistry; French, German, or English; Military.
3. Analytical Geometry; Advanced Descriptive Geometry; Chemistry; French, German, or English; Military.

SECOND YEAR.

1. Differential Calculus; Land Surveying; Physics; Military.
2. Advanced Analytical Geometry; Topographical Drawing and Transit Surveying and Leveling; Physics; Military.
4. Integral Calculus; Topographical Surveying; Physics; Military.

THIRD YEAR.

1. Analytical Mechanics; Mine Attack; Mineralogy; Themes and Elocution.
2. Resistance of Materials; Assaying; Geology; Themes and Elocution.
3. Hydraulics; Mine Surveying; Geology; Themes and Elocution.

FOURTH YEAR.

1. Ore Dressing; Heat Engines; Geology.
2. Mine Engineering; Hydraulic Engines; Chemistry.
3. Mine Engineering; Chemistry; Metallurgy.

ARCHITECTURE.

The object of this course of study is to prepare graduates for the profession of architecture, as architects, draughtsmen, and superintendents of construction. A thorough knowledge of scientific principles applied to construction, and of drawing in its various developments, a practical acquaintance with the methods and processes of the various

ARCHITECTURAL DRAWING ROOM

building trades, as well as a considerable degree of skill in the use of tools, are all essential to the fullfillment of this purpose, and are therefore made prominent in the course of instruction.

Methods of Instruction.

The principal lines of technical study take up the theory and practice of construction, the history and esthetics of architecture, architectural drawing as now practiced in offices, as well as the various modes of finishing drawings, the use of the architectural orders; and the usual routine and methods of office practice, so far as this can be successfully taught in a professional school.

This instruction is imparted by the study of text-books, with recitations and the solution of numerous special problems, also by lectures, as well as by the use of syllabuses instead of text-books, where suitable works do not yet exist. Engravings, photographs, models and sketches, are employed as illustrations.

Drawing is practiced during the entire course, and whenever possible, the student is required or encouraged to produce original designs. Opportunity is also afforded for two years' instruction in free hand drawing, modeling, water colors, designing, and sketching from nature.

Shop practice commences with the production of true plane surfaces in wood, and extends through joinery, cabinet work, turning, and veneering, to the making of models of architectural constructions to scale from drawings.

Apparatus.

A collection of casts donated by the Spanish government, and another of casts of various architectural details from Lehr, of Berlin, belong to the departments of architecture and of design; models of ceilings, roof trusses, stairs and Schroeder's models of joints in wood-work and of construction in cut stone work, in the engineering museum.

The department of architecture also possesses a large and rapidly increasing collection of engravings and photographs illustrating the history of architecture and art, and their practical applications in all ages. The collection is mounted on about 10,000 cards, 11x14 inches, and is classified in two parts, one for the use of the class in history of architecture, the other for use by the various classes in designing; both series are minutely subdivided to facilitate easy reference, and are always open for free use, thus forming a most valuable working library. The plates issued by the most important American architectural journals are to be found here. This collection is placed in one of the architectural rooms.

The casts, photographs, etc., of the art gallery. In the University Library are many of the best English, German, French, and American architectural works and periodicals.

A large and well equipped carpenter and cabinet shop containing cabinet benches and sets of fine tools for classes in shop practice; foot and power lathes; machine saws, planers, molder, tenoner, shaper, jig saw, mortiser, boring machine, etc.

An architect's level, rod, and 100-foot steel tape.

A 5 x 7 folding kodak of latest pattern, fitted with roll holder, plate holders, and film carriers. An 8 x 10 bellows camera, with a Steinheil aplanatic, wide angle lens, for copying architectural views and interiors.

Architectural Course.

FIRST YEAR.

1. Advanced Algebra; Elements of Draughting; Shop Practice; French, German, or English; Military.
2. Trigonometry; Descriptive Geometry and Lettering; Shop Practice; French, German, or English; Military.
3. Analytic Geometry; Advanced Descriptive Geometry; Shop Practice; French, German, or English; Military.

SECOND YEAR.

1. Differential Calculus; Wood Construction; Physics; Military.
2. Advanced Analytical Geometry; Stone, Brick, and Metal Construction; Physics; Military.
3. Integral Calculus; Sanitary Construction; Physics; Military.

THIRD YEAR.

1. Analytical Mechanics; Architectural Drawing; Chemistry; Themes and Elocution.
2. Resistance of Materials; History of Architecture; Architectural Drawing; Themes and Elocution.
3. Roofs; History of Architecture; Surveying; Themes and Elocution.

FOURTH YEAR.

1. Superintendence, Estimates, and Specifications; Architectural Perspective; Free Hand Drawing, or Modeling.
2. Heating and Ventilation; Architectural Design; Free Hand Drawing, or Water Colors; Thesis.
3. Esthetics of Architecture; Architectural Design; Free Hand Drawing, or Sketching; Thesis.

ARCHITECTURAL ENGINEERING.

The especial purpose of this course of study is to qualify graduates for the profession of architecture, and particularly as architects, struc-

tural draughtsmen, and computers, as well as superintendents of construction. It is intended for those students preferring the mathematical and structural side of architecture to its artistic side, and for those who wish to acquire a thorough knowledge of iron and steel construction as it is now executed in architectural structures.

The course of study differs from that in architecture in the following particulars: Hydraulics and surveying are both required, the last being a single term study arranged for architectural students. Masonry construction, bridge analysis, and bridge designing, as taught to civil engineers, are taken instead of the second year of work in advanced free hand drawing, such as modeling, industrial design, and color design. A term of work in advanced graphics is also offered in lieu of architectural perspective. The remainder of the course of study is identical with that in architecture. The methods of imparting instruction are also similar, and are fully described elsewhere.

Architectural Engineering Course.

FIRST YEAR.

1. Advanced Algebra; Elements of Draughting; Shop Practice; French, German, or English; Military.
2. Trigonometry; Descriptive Geometry and Lettering; Shop Practice; French, German, or English; Military.
3. Analytical Geometry; Advanced Descriptive Geometry; Shop Practice; French, German, or English; Military.

SECOND YEAR.

1. Differential Calculus; Wood Construction; Physics; Military.
2. Advanced Analytical Geometry; Stone, Brick, and Metal Construction; Physics; Military.
3. Integral Calculus; Sanitary Construction; Physics; Military.

THIRD YEAR.

1. Analytical Mechanics; Architectural Drawing; Chemistry; Themes and Elocution.
2. Resistance of Materials; History of Architecture; Architectural Drawing; Themes and Elocution.
3. Roofs; History of Architecture; Hydraulics; Themes and Elocution.

FOURTH YEAR.

1. Masonry Construction: Superintendence, Estimates, and Specifications; Architectural Perspective, or Advanced Graphics.
2. Bridge Analysis; Heating and Ventilation; Architectural Design; Thesis.
3. Bridge Design; Surveying; Architectural Design; Thesis.

COLLEGE OF SCIENCE.

SCHOOLS.

Chemistry; Natural Science.

FACULTY.

Thomas J. Burrill, Ph.D., Acting Regent, Botany.
Stephen A. Forbes, Ph.D., *Dean*, Zoölogy and Entomology.
Charles W. Rolfe, M.S., Geology.
Arthur W. Palmer, Sc.D., Chemistry.
Samuel W. Parr, M.S., Chemistry.
Howard S. Brode, Assistant in Zoölogy.
Robert H. Forbes, B.S., First Assistant in Chemistry.
William E. Sandford, Ph.C., Second Assistant in Chemistry.
Alice M. Barber, B.S., Assistant in Botany.

MEMBERS OF OTHER FACULTIES GIVING INSTRUCTION IN THIS COLLEGE.

Edward Snyder, M.A., German.
James D. Crawford, M.A., History.
James H. Brownlee, M.A., Rhetoric and Oratory.
Frank F. Frederick, Industrial Art and Design.
Elbridge R. Hills, Captain U.S.A., Military Science.
M. R. Paradis, M.A., French.
Herbert J. Barton, M.A., Latin.
Daniel K. Dodge, Ph.D., English Language and Literature.
George W. Myers, M.L., Mathematics.
Daniel W. Shea, Ph.D., Physics.
Edith Adelaide Shattuck, Assistant in Industrial Art and Design.

COLLEGE OF SCIENCE.

The College of Science affords an opportunity for the thorough study of the natural and physical sciences, either as specialties or as the substance of a liberal education. It is possible for the student to take a

year each (five exercises a week) in chemistry, physics, zoölogy, botany, and geology, with a considerable amount of language, literature, and general studies; or to concentrate his science work on one of several subjects; taking, for example, four years in chemistry or three years in either botany or zoölogy.

The main purpose of the courses in science is to give a liberal education based essentially upon a wide acquaintance with a considerable group of related sciences, or upon a more thorough knowledge of a smaller number leading to special pursuits. Access to the elective literary and historical subjects open to the student in these courses is conditioned only by a minimum requirement with respect to subjects more important to the immediate ends of the College of Science.

COURSES OF INSTRUCTION.

Chemistry.

Chemistry is taught in 15 courses of instruction. The regular four years' course required of students in the school of chemistry comprises courses 1 to 11, inclusive. Course 12 is for agricultural students taking two years of chemistry.

1. General and Experimental Chemistry.—This course is intended to serve as an introduction to the subject of chemistry and is directed chiefly to the fundamental and general principles of the science. The work of the term consists of illustrated lectures, recitations upon the subject matter of the lectures and upon text-book lessons, and of practice in the laboratory. The laboratory work, comprising a series of experiments illustrative of chemical principles and their applications, and involving a consideration of the properties of some of the more important elements and their compounds, serves in part as a preparation for the work of the class room. *Remsen's Introduction to Chemistry. Fall term, full study.* Professor Palmer.

2. Inorganic Chemistry.—This course is required of all chemical and pharmaceutical students. The tables of Meyer and Mendelejeff constitute the basis of the study. The various chemical principles and phenomena are so grouped and classified as to make their use in subsequent practice more intelligent and accurate. The work is from lectures and assigned text. *Remsen's Advanced Course. Winter and spring terms, half study.* Professor Parr.

   Required: Chemistry, 1.

3. Qualitative Analysis.—This course includes a systematic and experimental study of the metallic elements, their salts and compounds and their chemical formulæ and reactions, together with the principles which underlie qualitative analysis. The work is done chiefly in the laboratory and includes the determination of the basic and acid constituents of unknown substances. *Prescott and Johnston's Qualitative Analysis. Winter and spring terms, full study.* Professor PARR.
Required: Chemistry, 1.

4. Advanced Qualitative Analysis.—This course follows 3 and is a continuation of the determination of unknown substances covering more complicated compounds. Following this, further application, and to a large extent an original use, of the knowledge gained is made in the preparation and purification of typical salts and compounds from the spent material which accumulates in other lines of work throughout the laboratory. *Prescott and Johnston's Qualitative Analysis. Spring term, full study.* Professor PARR.
Required: Chemistry, 1, 2, 3.

5. Quantitative Analysis.—The work in this course occupies the fall term of the sophomore year. It begins with the analysis of salts of definite and known composition, the purpose being to gain facility and accuracy of manipulation together with a general knowledge of the principles involved in the best practice. The class room work is chiefly lectures and recitations upon assigned topics in *Fresenius's Quantitative Analysis. Fall term, full study.* Professor PARR.
Required: Chemistry, 1, 2, 3, 4.

6. Volumetric Analysis and Assaying.—In this course practice is given in the use of methods for special lines of work, including volumetric assays and analysis of ores and furnace products. This is followed by the electrolytic determination of copper, etc., and by the usual fire assays of lead, silver, and gold. The class room instruction in this term is mainly by lectures and special notes, the student being required to read assigned parts of the works of *Kerl, Mitchell, and others. Winter term, full study.* Professor PALMER.
Required: Chemistry, 1, 2, 3, 4, 5.

7. Agricultural Chemistry.—In this course lectures upon the chemistry of agriculture are given accompanied by laboratory work in the quantitative analysis of some of the materials employed in agriculture and agricultural products. The laboratory practice includes the analyses of complex silicates, as feldspar, mica, or glass, and of

commercial fertilizers, milk, and grain. *Spring term, full study.* Professor PALMER.

Required: Chemistry, 1, 2, 3, 4, 5.

8. Technological and Industrial Chemistry.—This course comprises a study of the best practice of iron and steel laboratories, test departments, etc., with special reference to rapid methods. It includes the technical analysis of pig iron and steels, paints and pigments, gas, etc. The class room work is chiefly devoted to the special applications of chemistry to the arts. Instruction is by lectures and recitations upon assigned topics in standard works of reference. *Wagner's Chemical Technology. Fall term, full study.* Professor PALMER.

Required: Chemistry, 1, 2, 3, 4, 5.

9. Organic Chemistry.—This course consists in a consideration of the principles and the processes of organic chemistry. The instruction comprises recitations, lectures, and laboratory practice. Bernthsen's Organic Chemistry is employed as a text-book, and is supplemented by lectures upon special topics and by references to the works of Richter, Roscoe and Schorlemmer, and Beilstein. In the laboratory the practice consists in the preparation of organic compounds, in accordance with the directions given in the text-book, with selections from the manuals of Levy and Fischer. Some time is also devoted to ultimate organic analysis. *Winter and spring terms, full study.* Professor PALMER.

Required: Chemistry, 1, 2.

10. Sanitary, Medical and Medico-Legal Chemistry.—This course includes such subjects as the sanitary examination of potable and mineral waters, urinalysis, toxicology, etc. During this course also subjects for original work in course 11 must be canvassed and a choice of themes made by the Thanksgiving recess, after which time and until the Holidays the work is of such a nature as to familiarize the student with the special methods and processes involved in the research contemplated and also with the bibliography of the subject. *Fall term, full study.* Professor PALMER.

Required: Chemistry, 1, 2, 3, 4, 5, 9.

11. Investigations and Thesis.—In this research work the student is required to make full use of the various sets of chemical journals, English, French, and German, as an essential means of extending his acquaintance with chemical literature and a drill in consultation of works of reference. It includes also the preparation of a thesis according to the rules laid down under "Degrees."

Throughout the course are lectures, and discussions on theoretical and thermo-chemistry, and in the history of chemistry. *Winter and spring terms, full study.* Professors PALMER and PARR.

Required: Chemistry, 1–10.

12. Agricultural Chemistry. —This course is arranged for agricultural students who elect two years of chemistry. It occupies the whole of the second year and is principally made up of (*a*) chemistry, 5; (*b*) chemistry, 9, winter term; (*c*) chemistry, 7. *Fall, winter, and spring terms, full study.* Professors PALMER and PARR.

Required: Chemistry, 1, 2, 3, 4.

Note. Agricultural students who elect three years of chemistry must pursue the courses in order as indicated for regular chemical students.

13. Assaying.—For students in mining engineering. The course in assaying consists of instruction by lectures and from text-books upon the ores, fuels, fluxes, furnaces, reagents, and chargers used in the fire assay of gold, silver, and lead ores. The laboratory practice includes daily use of the crucible and muffle furnaces and the manipulations connected with fire assaying. The rapid wet assay of copper and zinc ores is given in close connection with the course in fire assaying. Same as assaying in Chemistry 6. *Winter term, full study.* Professor PALMER.

Required: Chemistry, 1, 3, 4.

14. Metallurgy.—Especial attention is given to the effect of impurities in ores upon metallurgical processes and finished products. Fuels, refractory materials, and fluxes are described and their value and application explained. The known chemical reactions are expressed in equations; ore mixtures are calculated from analyses and experiments; and the size, construction, and working of furnaces are treated in accordance with modern practice. A series of models of furnaces and specimens of furnace material and products are used in illustration. The University is sufficiently near large and well conducted works smelting and refining iron, zinc, copper, silver, and lead for excursions to be made to them during the course. Instruction is given from text-books when possible, but great freedom in choosing material from later publications and from the present practice of actual plants is used in the supplementary lectures. *Greenwood's Steel and Iron; Peter's Modern American Methods of Copper Smelting. Spring term, full study.* Professor PARR.

Required: Chemistry, 1, 3, 4; Physics, 1.

15. Organic Analysis.—One term's work, mainly devoted to proximate analysis of organic compounds and mixtures of natural occurrence or of other origin. The work is both qualitative and quantitative and includes determinations of the more important alkaloids, carbohydrates, acids and other essential constituents of organic substances. *Dragendorff's Plant Analysis; Prescott's Organic Analysis; Allen's Commercial Organic Analysis. Spring term, full study (elective).* Professor PALMER.

Required: Chemistry, 1, 2, 3, 9.

PHARMACY.

1. Pharmacy.—History of pharmacopœias; chemical and galenical preparations; official standards of purity, etc. In the spring term pharmacognosy or the study of crude drugs, means of recognition, etc., in the hands of the student. *U. S. Pharmacopœia; U. S. and National Dispensatories; Remington's Practice of Pharmacy; Maisch's Organic Materia Medica; National Formulary. Fall, winter, and spring terms, full study.* Mr. SANDFORD.

2. Pharmacy.—Advanced pharmacy consisting of the study of dispensatories, classification and study of medicines, drugs, etc., doses, effects, etc. In the second term the study of prescriptions is taken up consisting of reading from actual files from the pharmacy; the study of incompatabilities and rules as to dispensing. In the third term a thorough course is given in compounding prescriptions at the prescription desk. Ample means are at hand for as practical a drill as is possible. *Fall, winter, and spring terms, full study.* Mr. SANDFORD.

MINERALOGY.

1. Mineralogy.—In the determination of minerals students work upon sets of unlabeled hand specimens. Familiarity with species and skill in applying the best and quickest methods of determination are attained by constant practice on a large number of specimens; and the lectures and other instruction acquaint students with the chemical composition and the schemes of classification. Especial attention is given to ores and rock-forming minerals. The lectures are extended to cover the whole series of minerals, but the time for laboratory practice is not sufficient to work on all. The succeeding term an opportunity is given to those who wish it for a continuation of laboratory practice, but credit will not be allowed unless especially granted. *Dana's Text-Book of Mineralogy. Fall term, full study.* Professor BALDWIN.

Required: Mathematics, 3, or 4; Chemistry, 1.

Geology.

In the department of geology four courses are offered. For those students who wish more than a general acquaintance with the subject a major course of one year is provided, covering thirty-six weeks of class room and laboratory instruction; and a supplementary course of twenty-two weeks is offered to those who select a geological subject as a thesis. Engineers who wish an acquaintance with those portions only of the science which bear most directly on their future work are offered a minor course of eleven weeks. A minor course of eleven weeks is offered to those desiring merely an outline of the most prominent facts and theories of geology, with some ideas of the methods by which the geologist arrives at his conclusions.

1. Geology, Major Course.—(*a*) Dynamic Geology. The instruction given under this head is intended to familiarize the student with the forces now at work upon and within the earth's crust, modeling its reliefs, producing changes in the structure and composition of its rock masses, and making deposits of minerals and ores. A series of localities is studied in which great surface changes have recently taken place, with a view to ascertaining the character of the forces producing such changes, and the physical evidence of the action of like forces in the past. The subject is taught by lectures, and is abundantly illustrated by maps, models, charts, and views.

(*b*) Petrographic Geology. The instruction under this topic is given by lectures and laboratory work. The subjects included are the classification of rocks, the methods used in their determination, the conditions governing the formation of each species, the decompositions to which they are liable, and the products of these decompositions. Each student is supplied with a set of blowpipe tools and reagents and a series of hand specimens covering all the common species of rocks.

(*c*) Historical Geology. The work on this subject is substantially an introduction to the history of geology as a science, and the developmental history of the leading geological doctrines. An attempt is also made to trace the history of each geological period, so far as may be done with the data in hand.

(*d*) Paleontology. The scheme of instruction in this subject places before the student the classification adopted for those organic forms occurring as fossils, together with the succession of the various groups that occur in the strata, with the cause, as far as known, for

their appearance and disappearance. The student is required to familiarize himself with selected groups of paleozoic fossils, abundant illustrations of which are placed in his hands. The subject is presented in lectures and demonstrations, each group being considered in connection with its nearest living representative.

(*e*) Economic Geology. The final term of this course is devoted to a study of the uses man may make of geologic materials, the conditions under which these materials occur, and the qualities which render them valuable. The instruction is given by lectures, with references to the various state and government reports, transactions of societies, and monographs in which these subjects are treated, as well as by demonstrations with materials from the collections of the University.

In dynamic and historical geology Dana's Manual is used as a reference book. Petrography is pursued by means of a blue-print adaptation of Rosenbusch for the crystalline rocks, and various authors for the fragmental. In paleontology Nicholson and Zittel are used for descriptions of the larger groups, Miller, for general distribution, and the various state surveys for species. *Winter, spring, and fall terms, full study.* Professor ROLFE.

Required: Chemistry, 1; Physics, 1, or 2; Mineralogy, 1; Botany, 1, or 6; Zoölogy, 1, or 5.

2. Investigations and Thesis.—For students who select a geological thesis guidance and facilities will be afforded for individual investigations in the field and laboratory. *Winter and spring terms, full study.* Professor ROLFE.

Required: Geology, 1.

3. Engineering Geology.—It is the object of this course to bring together those parts of geology which will be of the greatest practical benefit to an engineer. The course will deal mainly with subjects connected with the origin, classification, and transformations of rocks, with the principles which govern the deposition and structure of rock masses; with the conditions under which the useful rocks and minerals occur, and the conditions which make them more or less valuable. The instruction is given by lectures and by demonstrations in the laboratory. *Winter term, full study.* Professor ROLFE.

4. General Geology, Minor Course.—This course includes a selection of such geological facts and theories as should be known to every intelligent person, with such discussion of them as the time will permit.

The subjects treated will be fully illustrated, and opportunity will be afforded for some study of rocks and fossils. *Spring term, full study.* Professor ROLFE.

METEOROLOGY.

1. Meteorology.—The study of those atmospheric movements which bring our changes of weather, with their relations to heat, cold, electrical conditions, wind, cloud, barometric pressure, etc., constitutes the work of the first half of the fall term. Abercrombie's Weather is used as an introductory text book; but most of the instruction is given by lectures, the study of charts, and attempts by the student to forecast weather changes. *Fall term, half study.* Professor ROLFE.

Required: Chemistry, 1; Physics, 1, or 2.

BOTANY.

Six courses of instruction are offered in this subject—five primarily intended to meet the wants of students making botanical work more or less a specialty, and the sixth occupying a single term, complete in itself, for students whose chief attention is given to other branches. Three to eight terms' work constitute a major course; that of the single term, course 6, a minor course. To a very large extent natural objects are studied rather than books; but constant endeavor is made to introduce students to pertinent existing literature. In the laboratory much use is made of the compound microscope and special attention is given to its manipulation for best results, and to the preparation of objects.

1. Histology, Morphology, and Physiology.—This major course extends through one year, beginning in the fall. At first systematic studies are made upon specially difficult natural orders of flowering plants; as Compositæ, Cyperaceæ, and Gramineæ; with attention given to nomenclature and to the principles of classification. After vegetation has been destroyed by frost the remainder of the fall term is devoted to the histology of plants. Students make and study microscopical sections and other preparations, make micro-chemical tests, draw figures, and write descriptive notes. Lectures or text-book recitations occur about twice a week.

The morphology and classification of special groups of plants, beginning with the lowest orders, constitute the work of the winter term. Compound microscopes are constantly in use, and the laboratory work is made the basis of instruction, variously aided and

extended by the study of the text-book and by lectures. Special attention is given to injurious fungi.

The third term is devoted to vegetable physiology and includes: the extent and causes of the movements of fluids in the tissues, the absorption of nutrient materials, respiration, transpiration, and assimilation; the causes, peculiarities, and results of growth; the relations and effects of external agencies, as heat, light, gravitation; self- and cross-fertilization; variation and heredity; movements and sensitiveness. The instruction is given by lectures and recitations, supplemented by required observations and experimental practice. *Bessey's Botany; Goebel's Outlines of Classification and Special Morphology; Vine's Lectures on Vegetable Physiology. Fall, winter, and spring terms, full study.* Professor BURRILL.

Required: Chemistry, 1; Art and Design, 4.

2. Bacteriology.—Bacteria and allied organisms are now known to play exceedingly important rôles in nature, and in the daily life and well being of man. This course is an introduction to existing knowledge upon the subject, and offers instruction in the modern methods of experimentation and research. The laboratory is well equipped for a limited number of students. Only those who can give extra time, when occasion demands, should undertake the work. Lectures and assigned reading accompany the laboratory work. *Fall term, full study.* Professor BURRILL.

Required: Botany, 1, or 6; Chemistry, 1; Art and Design, 4.

3. Systematic Botany.—There is offered in this course an opportunity for advanced work in special groups of cryptogamic plants to which an introduction is made in the winter term of course 1. The determination and classification of species and studies upon life histories largely occupy the time. The methods of bacteriology are used in the cultivation of fresh material. Students who propose to take the course should give notice of the fact at the beginning of the year or earlier, and should make collections for themselves. Laboratory work constitutes the principal part of the course. *Winter term, full study.* Professor BURRILL.

Required: Botany, 1, 2; Chemistry, 1; Art and Design, 4.

4. Plant Reproduction and Development.—Studies are made upon self- and cross-fertilization, embryology, and development, and upon special topics in physiology. Laboratory work supplemented by

lectures and assigned reading. *Strasburger's Practical Botany; Detmer's Pflanzenphysiologisches Prakticum. Spring term, full study.* Professor BURRILL.

Required: Botany, 1; Chemistry, 1; Art and Design, 4.

5. Investigations and Thesis.—Facilities are offered for original investigations upon selected subjects upon which may be based a thesis required for a degree. Special arrangements should be made with the instructor during the preceding year or at least not later than the beginning of the year in which the work is to be taken. *Laboratory work, full study.* Professor BURRILL.

Required: Botany, 1; Chemistry, 1; Art and Design, 4.

6. General Botany.—This minor course is offered to students who have but a single term of botanical study. An endeavor is made to present a general view of the science and to provide an introduction to modern methods of work. Lectures are given and two to four hours a week of laboratory field work are required. *Spring term, full study.* Miss BARBER.

ZOÖLOGY.

Zoölogy is taught in five courses: (1) a major course (restricted elective) of a full year, two hours a day, primarily for students of natural science; (2) a term of embryology for those who have taken course 1; (3) two terms (senior) for those who have taken courses 1 and 2, and who select a zoölogical subject for the graduating thesis; (4) a year's work (open elective) in systemetic zoölogy, for advanced students only; and (5) a general course of single term, offered as a minor course in the school of natural science and as an elective to the students of the University at large.

1. General Zoölogy, Major Course.—It is the immediate object of this major elective course to make working zoölogists, and its secondary object is to draw from zoölogical science its distinctive discipline as an element in a liberal education. It is planned with a view to giving to students a wide acquaintance with the methods of zoölogical research in field, laboratory, and library, and a sound and accurate knowledge of zoölogical theory and of the leading facts of observation and experiment upon which such theory rests. The first practical work of the fall term (on the earthworm and on Hydra) is made an introduction to the special methods of the zoölogical laboratory. The remainder of the term is given to the Protozoa and Cœlenterata, the former of which are studied at length in the laboratory and lecture room in respect to their structure, physiology, and classification; their relations to plants; and

their relations to the organization, embryology, and developmental history of the higher animals. These subjects are used to elucidate and illustrate the general theory of zoölogy, which is here presented in outline, to be completed and filled in as the work of the course proceeds.

The second term is devoted to the morphology, physiology, and general classification of the remaining invertebrates, with principal attention to the Arthropoda. Early in this term a course of lectures on general embryology is given, with principal reference to the development of the earthworm as a type. The laboratory work includes the thorough study, by each member of the class, of an assigned species as a semi-independent investigation, the results of which are presented at the end of the term in a paper and drawings.

The third term's work is done on vertebrates, with principal attention in the laboratory to anatomical methods for the larger animals. The work of this term includes also a series of studies made by the class together upon the smaller aquatic animals of the neighborhood, taken as a biological group.

The important features of the method in this course are comparative dissections, descriptions, drawings, and microscopic preparations of types of the greater groups as a basis for the study of the subkingdoms and their more important divisions; lectures on the comparative physiology of selected forms, with especial reference to their relations to their environments, organic and inorganic, present and past; studies of the zoölogical classification, commonly introduced by analytical synopses, exhibiting the technical relations of groups, together with lectures and elaborate reviews directed especially to the general system of homologies by which zoölogical science is organized as a coherent whole. *Fall, winter, and spring terms, full study.* Professor FORBES.

Required: Chemistry, 1. Physiology, 1, must be taken with the first term's work of this course, if not before.

2. Embryology.— A course in practical and general embryology is given in the fall term as a sequel to course 1. It is required of all students intending to present a zoölogical thesis, except such as take course 4. It includes laboratory work upon the development of the chick, with assigned reading in general embryology for half a term, and an equal amount of reading on the evolution of animal life. *Fall term, full study.* Professor FORBES.

Required: Zoölogy, 1.

3. Investigations and Thesis.—Candidates for graduation in the College of Science who select a zoölogical subject as a thesis are required to spend at least two hours a day for the winter and spring terms of their senior year in making an independent investigation of some selected zoölogical subject. While this work is done under the general supervision of an instructor, it is in its methods and responsibilities essentially original work. *Winter and spring terms, full study.* Professor FORBES.

Required: Zoölogy, 1.

Note.—The texts most frequently used in the foregoing courses are Sedgwick's Claus, in general zoölogy, Haddon's Introduction to the Study of Embryology, and Foster and Balfour's Elements, in embryology. The dissections and other morphological studies are made with the aid of laboratory manuals prepared in the department and furnished to students in cyclostyle print. The determinative work of the course is guided by synopses, descriptive papers, and the like, also prepared in the laboratory and reproduced by the cyclostyle. A very full series of laboratory guides and manuals is at hand for reference.

4. Systematic Zoölogy (including Entomology).—To students who have course 1 an opportunity is offered for a year's work, two hours a day, in systematic zoölogy (including entomology), to be taken individually, under the guidance of an instructor. It may be closely adapted to the bent and ability of the student. It should consist essentially of determinative and descriptive work upon selected groups, and must be concluded with a synoptic or monographic paper upon some group of animals, based upon personal study.

For students of this course very unusual facilities are at hand in the library and collections of the State Laboratory of Natural History, which occupy rooms adjoining those of the zoölogical department of the University. *Fall, winter, and spring terms, full study.* Professor FORBES.

Required: Zoölogy, 1.

5. General Zoölogy, Minor Course.—For the benefit of students of natural science specializing in some other direction, as well as for literary students desiring some general knowledge of zoölogy, a course of a single term is offered which contains enough laboratory and descriptive work to give a practical idea of the method of zoölogical science, and a sufficient number of lectures, with study of text, to cover the general subject in a cursory manner. Principal attention is paid to the Protozoa, to insects, and to birds. *Winter term, full study.* Professor FORBES.

Entomology.

1. General and Economic Entomology.—A single course is offered in this subject. It is designed mainly as a preparation for economic work and investigation as a specialty; but students whose principal interest is in structural or systematic entomology, may take a special line of such work in the second term.

A large part of the time is devoted to the study of the characters, life histories, habits, and economic relations of a selected list of especially important insects. Specimens of these in their different stages, together with synopses and descriptions of the families to which they belong, are furnished the students, and the essential facts not discoverable by direct observation are given in lectures or acquired by study of text.

Practice in field observation is given as opportunity offers, and all are taught the ordinary methods of the collection, preparation, and care of specimens, together with the approved methods of controlling the ravages of the injurious species.

A personal study, continuous for a term, of the life history and habits of some insect species is made by each student, and is finally reported in the form of a thesis.

In both field and laboratory an extraordinary opportunity is offered to competent students of this course to observe and assist in practical entomological work and original research. *Winter and spring terms, full study.* Professor Forbes.

Required: Zoölogy, 1, or 5; Botany, 1, or 6.

Physiology.

1. Human Physiology.—The students admitted to this class have already passed an entrance examination in the elementary principles of anatomy and physiology.

The main objects of the course are to make the student familiar with the position, structure, and healthy action of those organs most liable to become diseased; to make plain the part which the nervous system plays in both the healthy and morbid action of the various organs, and in the problems of nutrition and energy.

The plan embraces lectures, recitations from the text-book, frequent readings from standard authors, and demonstrations from fresh dissections, alcoholic specimens, microscopical preparations, skeletons, and the manikin. *Martin's Human Body. Fall Term, full study.* Professor Rolfe.

Required: Chemistry, 1.

GENERAL BIOLOGY.

1. General Advanced Biology.—For those who have taken a major course in either botany or zoölogy, a single term of general biology is arranged and especially commended. It is intended to review, extend, systematize, and unify the student's knowledge of the phenomena, the history, and the laws of life, and of the relations of plant and animal, of living and not living matter, and of biology to other sciences and to philosophy. It will be taught chiefly by lectures and by assigned reading. It is properly a senior study for students of the school of natural science. *Spring Term, full study.* Professor FORBES.

Required: Botany, 1, or Zoölogy, 1.

ANTHROPOLOGY.

1. Anthropology.—The objects of this course are to summarize the facts and theories relating to the origin of man; to introduce the comparative study of races with a view to ascertaining their relations to each other and to primitive man; and to study the steps by which races change from the savage to the enlightened stage. The instruction is given by lectures, reading, and recitations. *Tylor's Anthropology. Fall term, half study.* Professor ROLFE.

The following subjects, offered to students in the College of Science, are described elsewhere, as noted:

In the College of Agriculture—
Veterinary Science, 3.

In the College of Engineering—
Mathematics, 1, 3, 5; Astronomy, 1; Physics, 1, 2; Electrical Engineering, 1.

In College of Literature—
Philosophy, 1, 2, 4; Pedagogy, 1 to 6; History, 1, 2, 4; French, 4, or 1, 2; German, 1, 4; Political Economy, 1; English Literature, 5; Rhetoric and Oratory, 1.

In School of Military Science—
Military Science, 1, 2.

In School of Art and Design—
Art and Design, 4.

SCHOOL OF CHEMISTRY.

The aim of the instruction in this school is to impart such a knowledge of chemistry as will enable the student to apply the principles of the science to the work of the druggist, pharmacist, and practical chemist, as

well as to investigations of chemical problems and to original research. The scope of the work is sufficiently broad to enable the student to specialize in the various callings open to the chemist and pharmacist. For the first three years specific courses are arranged, but much of the laboratory work of these courses may be varied to suit the purposes or the needs of the individual student. The fourth year is mainly occupied with investigation along special lines, the subject being chosen under the direction and with the advice of the professor in charge, with particular reference to the student's aims.

Students, not members of the College of Science, who desire to pursue studies in the chemistry of agriculture, or in metallurgy, may have ample opportunity for such work on consultation with the professor in charge.

Chemical Laboratories.

A building 75 x 120 feet, and four stories in height, is devoted to chemistry. The basement contains a furnace room for assaying provided with crucible and muffle furnaces, and a large store room for chemicals and apparatus. The first story contains a lecture room capable of seating 200 persons, and a laboratory for practice in general experimental chemistry and qualitative analysis, large enough to accommodate 152 students; 128 desks are now fitted up, each having an evaporating hood, gas, and water. There are a spectroscope table, a blowpipe table, and a store room stocked with apparatus and chemicals. Also, a good sized room fitted for the preparation of lecture experiments, and for storing apparatus, etc. The second story, designed for the use of advanced students, has the following apartments: A lecture room, a large laboratory for quantitative analysis and general advanced work, now containing 64 desks; a large well lighted balance room, containing analytical balances of the best European and American make; a pharmacy furnished with drugs and pharmaceutical preparations; a private laboratory for instructors; and a gas analysis room entirely cut off from the system of heating, in order to avoid fluctuations of temperature. The laboratories are amply supplied with stocks of chemicals and apparatus of the most approved description and quality, for the work in the various branches of the science.

Classification of Subjects and Requirements for Graduation.

Forty-one credits for full terms of work, thirty-two of which shall be taken from the following list of required subjects, including military,

QUALITATIVE LABORATORY.

are required for graduation from the chemical courses. For the nine remaining credits five subjects must be chosen from the restricted electives and the others may be taken from these or from the open electives.

REQUIRED STUDIES

Chemistry (1 to 11), 13 credits.
German (1, 2), 5 credits.
French (4), 3 credits.
Mathematics (1, 3), 2 credits.
Physics (1), 3 credits.
Philosophy (1), 1 credit.
Mineralogy, 1 credit.
Military, 2 credits.
Rhetoric and Oratory (1), 2 credits.

RESTRICTED ELECTIVES.

Botany (6 or 7), 1 or 3 credits.
Zoölogy (5 or 1), 1 or 3 credits.
Geology (4 or 1), 1 or 3 credits.
Physiology, 1 credit.
Political Economy, 1 credit.
Philosophy (2, 4), 2 credits.
History (4), 1 credit.

OPEN ELECTIVES.

Chemistry (advanced work), 3 credits.
Electrical Engineering (1), 1 credit.
English Literature (5), 3 credits.
German, 1 credit.
Bacteriology, 1 credit.
Mathematics (5 or 6, 7), 4 credits.
Materia Medica, 3 credits.
Metallurgy, 1 credit.
Art and Design (5), 1 credit.
Pedagogy (1 to 6), 3 credits.
Astronomy (4), 1 credit.

COURSES OF STUDY

Chemical Course

FIRST YEAR

1. General Chemistry (1); Advanced Algebra; French; Military.
2. Inorganic Chemistry (2); Qualitative Analysis (3); Trigonometry, French, Military.
3. Inorganic Chemistry (2); Qualitative Analysis (4); Mathematics or Botany (6); French, Military.

SECOND YEAR

1. Quantitative Analysis (5); Physics; German; Military.
2. Volumetric Analysis and Assaying (6); Physics; German; Military.
3. Agricultural Chemistry (7); Physics; German; Military.

THIRD YEAR.

1. Technological Chemistry (8); Mineralogy; German; Themes and Elocution.
2. Organic Chemistry (9); Geology etc., one elective); German; Themes and Elocution.
3. Organic Chemistry (9); Geology etc. (two electives); Themes and Elocution.

BALANCE ROOM

FOURTH YEAR.

1. Sanitary Chemistry (10); Geology, etc. (two electives.)
2. Research and Thesis (11); Chemistry, etc. (two electives.)
3 Research and Thesis (11); Chemistry, etc. (two electives.)

Two Years' Course in Pharmacy.

[Not leading to a degree.]

FIRST YEAR.

1. General Chemistry (1); Pharmacy (1); Botany (1); Military.
2. Qualitative Analysis (3); Pharmacy (1); Botany (1); Military.
3. Qualitative Analysis (4); Pharmacy (1); Botany (1); Military.

SECOND YEAR.

1. Quantitative Analysis; Pharmacy (2); Physiology; Military.
2. Organic Chemistry; Pharmacy (2); Materia Medica; Military.
3. Organic Analysis; Pharmacy (2); Materia Medica; Military.

By an earnest prosecution of the studies laid out in this course the student may thoroughly prepare himself for the examinations required by the State Board of Pharmacy for registration as pharmacists.

The work outlined above leaves no time during the college year for the drug store practice required by law for a registered pharmacist. This practice must therefore be had at other times.

SCHOOL OF NATURAL SCIENCE.

The courses in the school of natural science are especially intended to provide a general preparation for professions and business pursuits requiring more of an acquaintance with the methods and facts of science than with those of literature. More specifically they are designed:

(1) To afford a thorough and liberal education with a basis in science and the modern languages.

(2) To prepare for the pursuit of specialties in zoölogy, entomology, botany, general biology, and geology, as a scientific career.

(3) To lay a liberal foundation in biological work and study for a course of medicine.

(4) To prepare for the teaching of the natural and physical sciences, either in the higher schools or as a professional specialty.

Natural History Hall.

The natural science building erected in 1892, at a cost of $72,000, is 94 feet in width by 134 feet in length, and two stories in height,

NATURAL HISTORY HALL

besides basement and attic. There is a spacious, well lighted, central hall, around which, on all sides, are situated laboratory, lecture, and subsidiary rooms, all lighted by an abundance of windows spaced for the best results. On the main floors there are eight laboratories for students' work and four for the professors' private use, four lecture halls, as many office rooms, and the requisite number of cloak rooms and closets. The basement and attic give abundance of room for storage and work, and may be used for laboratory purposes.

The building is occupied by the departments of botany, zoölogy, physiology, mineralogy, and geology. The laboratories for these subjects have extensive equipments and give excellent opportunity for the best instruction and practical work. With these superior quarters and advantages the instruction in natural science will be still more prominent than heretofore in this rapidly growing work of the University. Present provision is also made in the building for the State Laboratory of Natural History, for the office of the State Entomologist, and for the office of the Agricultural Experiment Station.

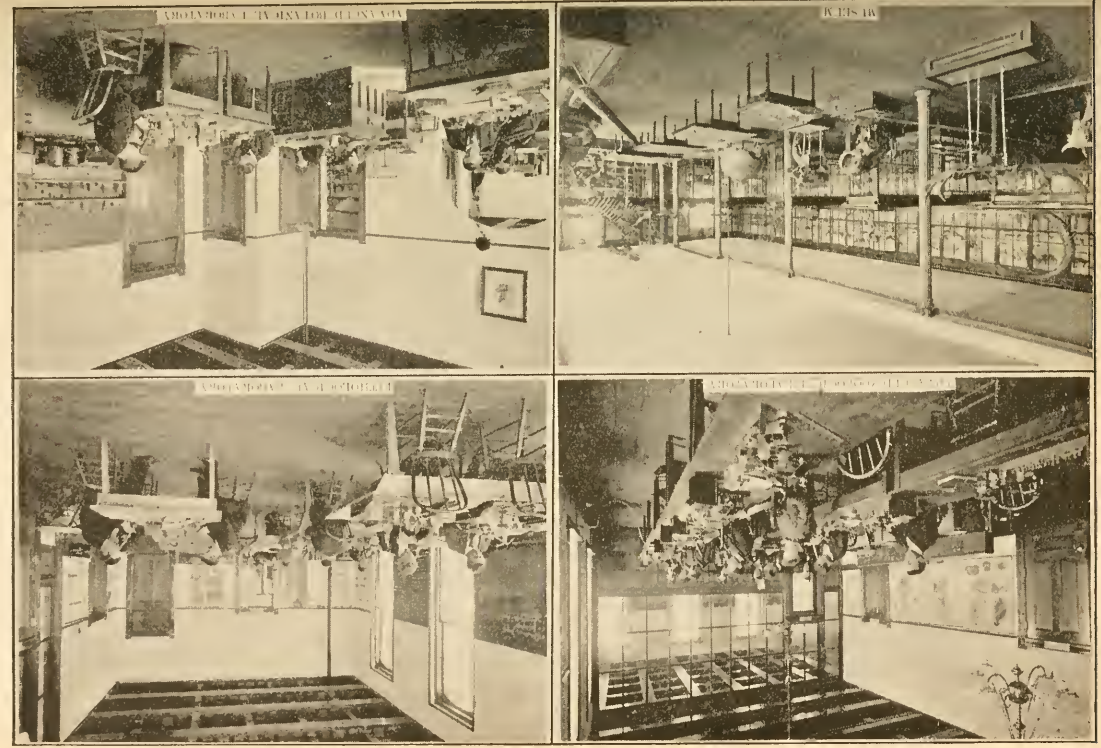
Classification of Subjects and Requirements for Graduates.

The studies offered in this school are divided into three groups: (1) required studies, (2) restricted electives, and (3) open electives. Under the head of restricted electives both major and minor courses are given, the former the maximum offering and the latter the minimum requirement in their respective subjects.

No student may graduate from the school of natural science until he has completed all required courses as given in group 1, and has done at least nine terms' work on one major subject, or twelve terms' work on more than one from group 2; and taken at least minor courses in all the other subjects of this group in which such courses are offered. He must further have received forty full-term credits (including military) for University studies.

Group 1. Required Subjects.

French (4, or 1), 3 credits.
German (1, 4), 5 credits.
Mathematics (1, 3), 2 credits.
Art and Design (4), 2 credits.
Rhetoric and Oratory (1), 2 credits.
History (4), or Political Economy (1), 1 credit.
Philosophy (1, or 3), 1 credit.
Military Science (1, 2), 2 credits.



GROUP 2. RESTRICTED ELECTIVES.

MAJOR COURSES.	MINOR COURSES.
Botany (1 to 5) 3, 6, or 9 credits.	Botany (6), 1 credit.
Zoölogy (1 to 4), 3, 6, or 9 credits.	Zoölogy (5), 1 credit.
General Biology, 1 credit.	Physiology, 1 credit.
Entomology, 2 credits.	Geology (4), 1 credit.
Mineralogy, 1 credit.	Physics (2), 1 credit.
Geology (1, 2), 3 or 5 credits.	Chemistry (1), 1 credit.
Physics (1), 3 credits.	
Chemistry (6, or 1 to 3), 3 or 6 credits.	

GROUP 3. OPEN ELECTIVES.

French (2), 3 credits.	Descriptive Astronomy (1), 1 credit.
English Literature (5), 3 credits.	Meteorology, ½ credit.
German (5), 1 credit.	Political Economy, 1 credit.
History (1 to 4), 4 credits.	Pedagogy (1 to 6), 5 credits.
Entomology, 2 credits.	Philosophy (2, 4), 2 credits.
Anthropology, ½ credit.	Mathematics, 1 credit.

Suggested Courses of Study.

The following arrangement of studies in definite courses is presented as an aid to election by students. The work of the freshman year must be taken in some one of these courses, but beyond this they have no binding force.

GENERAL COURSE IN BIOLOGY.

Students desiring uniform major courses in the biological subjects, with a maximum amount of the related sciences and the modern languages, are advised to take substantially the following course. It is recognized by the Illinois State Board of Health as the equivalent of one year's study in a three years' medical course, or of two years' medical study and one course of lectures in a four years' course in medicine.

FIRST YEAR.

1. Chemistry; Advanced Algebra; Physiology; Military.
2. Chemistry; Trigonometry; Drawing; Military.
3. Chemistry; Astronomy, or Mathematics; Drawing; Military.

SECOND YEAR.

1. Botany; Physics; French; Military.
2. Botany; Physics; French; Military.
3. Botany; Physics; French; Military.

THIRD YEAR.

1. Zoölogy; Mineralogy; German; Themes and Elocution.
2. Zoölogy; Geology; German; Themes and Elocution.
3. Zoölogy; Geology; German; Themes and Elocution.

FOURTH YEAR.

1. Embryology; Geology; German.
2. Thesis; Logic; German.
3. Thesis; Political Economy; General Biology.

SPECIAL BIOLOGICAL COURSES.

Courses in botany and zoölogy are offered those wishing to specialize early in either of these sciences, and to avail themselves fully of all the resources of the University in the major subject chosen.

COURSE IN BOTANY.

FIRST YEAR.

1. Chemistry; French; Advanced Algebra; Military.
2. Drawing; French; Trigonometry; Military.
3. Drawing; French; Astronomy, or Mathematics; Military.

SECOND YEAR.

1. Botany; Physiology; German; Military.
2. Botany; Physics; German; Military.
3. Botany; Physics; German; Military.

THIRD YEAR.

1. Botany; History; German; Themes and Elocution.
2. Botany; History; German; Themes and Elocution.
3. Botany; History; Geology; Themes and Elocution.

FOURTH YEAR.

1. Anthropology and Meteorology; Psychology; History of Civilization.
2. Botany (Thesis); Logic; Experimental Psychology.
3. Botany (Thesis); Political Economy; General Biology.

COURSE IN ZOÖLOGY.

FIRST YEAR.

1. Chemistry; French; Advanced Algebra; Military.
2. Drawing; French; Trigonometry; Military.
3. Drawing; French; Botany; Military.

SECOND YEAR.

1. Zoölogy; Physiology; German; Military.
2. Zoölogy; Physics; German; Military.
3. Zoölogy; Astronomy; German; Military.

THIRD YEAR.

1. Zoölogy; History; German; Themes and Elocution.
2. Zoölogy; History; German; Themes and Elocution.
3. Zoölogy; History; Geology; Themes and Elocution.

FOURTH YEAR.

1. Anthropology and Meteorology; Psychology; History of Civilization.
2. Zoölogy (Thesis); Logic; Experimental Psychology.
3. Zoölogy (Thesis); Political Economy; General Biology.

Science Teachers' Courses.

Those who wish to fit themselves especially for teaching zoölogy, botany and geology, in high schools, academies, seminaries, and the like, may advantageously substitute some of the pedagogical subjects of the course in philosophy and pedagogy, for German, logic and political economy in the above general course in biology.

Similarly, pedagogical subjects may be elected by those taking special botanical or zoölogical courses and wishing to prepare for the teaching of botany or zoölogy as a specialty.

For those desiring to qualify themselves in physics and chemistry with special reference to teaching, six terms' work in chemistry, three in physics, and six in pedagogy are offered.

Course Preparatory to Medicine.

For students intending to study medicine, and not wishing to take a full biological course, a two years' course is offered, not leading to a degree. Some knowledge of Latin is very desirable.

COLLEGE OF LITERATURE.

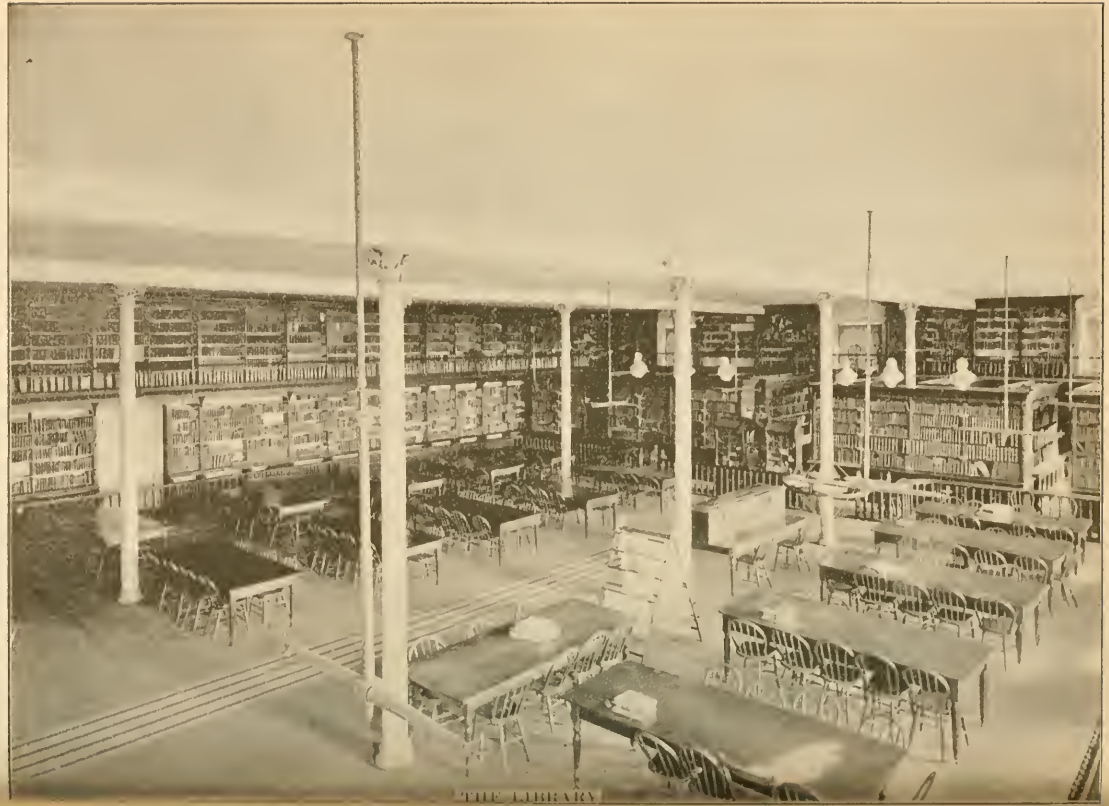
School of English and Modern Languages; School of Ancient Languages; School of Philosophy and Pedagogy.

FACULTY.

Thomas J. Burrill, Ph.D., Acting Regent, Botany.
Edward Snyder, M.A., *Dean*, German.
James D. Crawford, M.A., History.
James H. Brownlee, M.A., Rhetoric and Oratory.
Frank F. Frederick, Industrial Art and Design.
Elbridge R. Hills, Captain U.S.A., Military Science.
Herbert J. Barton, M.A., Latin.
M. R. Paradis, M.A., French.
Charles M. Moss, M.A., Ph.D., Greek.
Daniel K. Dodge, M.A., Ph.D., English Language and Literature.
Katharine Merrill, B.A., English Language and Literature.
William O. Krohn, Ph.D., Psychology and Pedagogy.
Herman S Piatt, B.A., Assistant in German and French.

MEMBERS OF OTHER FACULTIES GIVING INSTRUCTION IN THIS COLLEGE.

Samuel W. Shattuck, C.E., Mathematics.
Stephen A. Forbes, Ph.D., Zoölogy.
Charles W. Rolfe, M.S., Geology.
Arthur W. Palmer, Sc.D., Chemistry.
Samuel W. Parr, M.S., Chemistry.
George W. Myers, M.L., Mathematics.
Daniel W. Shea, Ph.D., Physics.



THE LIBRARY

COLLEGE OF LITERATURE.

The object of the courses in this College is to furnish a sound and liberal education to fit students for the general duties of life, and especially to prepare them for those professions and pursuits which require a large measure of literary and scientific knowledge and training. They meet the wants of those who wish to prepare themselves for the labors of the press as editors and publishers, for teachers in the higher institutions, or for the transaction of public business.

Instruction.

The plan of instruction embraces, besides the ordinary text-book study, lectures and practical exercises in all the departments, including original research, essays, criticism, and other work intended to illustrate the studies pursued, and to exercise the student's own powers.

A prominent aim will be to teach the right use of books, and thus to prepare the students for self-directed investigation and study, which will extend beyond the curriculum of his school and the period of his graduation. With this view, constant use of the already large and continually enlarging stores of the library will be required and encouraged.

The library is well supplied with works on history, philosophy, political science, and pedagogy, also on English, American, French, German, and classic literature. It contains at present over twenty-three thousand well selected volumes, and is constantly growing by purchase at home and abroad. Valuable American and foreign periodicals are received regularly in the reading room.

COURSES OF INSTRUCTION.

Philosophy.

[The courses in Philosophy are open to such students only as have completed at least two years of University work.]

1. Psychology.—In this course are considered the more general problems of the mental life of the normal individual, especially those that have a living interest for the student, and find illustration in his every day life. Among the large number of topics discussed the following are the chief: sensation, relation of mental activity to bodily changes, habit, attention, memory, imagination, association of ideas, reasoning, emotion, instinct, will, localization of cerebral functions, dreams, illusions, hypnotism, and time relations of mental phenomena. The

course is fully illustrated at difficult points by the use of apparatus, charts, and photographs sufficient to acquaint the class with the more modern methods of psychological investigations. Endeavor is made to give the class, in the form of lectures or otherwise, the more important results of recent researches. A considerable number of new reference books have been purchased, and all the important psychological journals are taken. *James's Psychology* (*Briefer Course*). *Fall term, full study.* Assistant Professor KROHN.

2. Logic.—This course embraces both inductive and deductive logic. The aim of the course is to make the principles of logic practical—to assist the student to employ correct methods in his thinking as well as in all his literary and scientific investigations. The following are some of the topics discussed: Principles of logic, conditions of valid thinking, forms of arguments, fallacies both formal and material, the scientific method, quantitative induction, the conditions of correct observation, meaning of explanation; the *rationale* of experiment, and criticism of arguments. Text-book and lectures. *Winter term, full study.* Assistant Professor KROHN.

3. History of Philosophy.—Lectures discussing general questions of philosophy constitute the first part of the course. These are followed by lectures based on Zeller's Outlines of Greek Philosophy, and Burt's and Schwegler's histories of modern philosophy. Special attention is given to the problems in philosophy that have arisen since the time of Kant, and to the views of Herbert Spencer. A large number of good reference works are accessible. *Spring term, full study.* Assistant Professor KROHN.

Required: Philosopy, 1.

4. Ethics.—This course embraces both a survey of the principles of ethics and a setting forth of the most significant distinctions of practical morality. A brief review is made of the principal theories current in ethics and the basis of their claim on the individual is carefully examined. The real purpose of the course is to bring out the psychological basis of moral relations, and to lay a foundation in the student's own mind for systematic thinking on ethical questions. The seminary method is introduced to a considerable extent and such subjects as freedom of the will, commercial ethics, and the moral spirit of Shakspere, are discussed. *Winter term, full study.* Assistant Professor KROHN.

Required: Philosophy, 1.

6. Experimental Psychology.—This course is made up of lectures and laboratory work with assigned reading. Experiments are made illustrating the time measurements of mental phenomena, the influence of the body upon the mind, and of the mind upon the body, and the psychical elements in sensations. Also an extended investigation into dreams, and allied phenomena.

A psychological laboratory is projected, and considerable apparatus already purchased and set up in working order. *Winter term, full study.* Assistant Professor KROHN.

Required: Philosophy, 1.

PEDAGOGY.

1. Educational Psychology.—In this course application is made to educational methods of the conclusions gained from the study of general psychology. A study is made of the child's mind, with especial reference to its content on entering school, and it is sought to discover the laws and principles according to which it unfolds and develops. An examination of the influences of each of the various studies upon mental growth is made. The methods of making practical school tests, by means of which the mental growth of school children is determined, are explained and illustrated. Original work is encouraged. This course is especially adapted to teachers, and is of value in that it enables one to frame, upon a rational basis, the curriculum of study. *Sully's Teachers' Hand-book of Psychology, and Lectures. Fall term, full study.* Assistant Professor KROHN.

2. School Hygiene.—The aim of this course is entirely practical. The endeavor is to enlighten those taking the course upon the best methods to be pursued with reference to the following points pertaining to school buildings: location, soil, elevation, and surroundings; form of structure, ventilation, heating, lighting, plumbing; equipment, especially furniture; play grounds and apparatus for physical exercise. The course will be illustrated with views of school buildings that are more or less perfect in their hygienic arrangements and visits to school houses will be made from time to time. Lectures and assigned reading. *Winter term, full study.* Assistant Professor KROHN.

3. Philosophy of Education.—In this course portions of Bain's Education as a Science, Spencer's Education, and Rosencranz's Philosophy of Education will be used as a basis supplemented with lectures. *Spring Term, Half Study.* Assistant Professor KROHN.

4. History of Education.—An historical and comparative study is made of educational methods of the Greeks, Chinese, Hebrews, and Egyptians; the work of the modern educational reformers, such as Comenius, Rousseau, Pestalozzi, Herbart, Bain, and Spencer, receives especial attention; and the present educational system of our own country is compared with that of France, Switzerland, Germany, and Russia. *Winter term, half study.* Assistant Professor KROHN.

5. School Supervision.—Historical view of school supervision in the United States; character of school supervision; state, county, and city supervision; the city superintendent of schools, his relation to pupils, to teachers; gradation and course of study; promotions; relation of superintendent to parents, to physical and moral training of pupils, to government and discipline; his relation to the board of education, to agencies for the improvement of teachers. *Fall term, full study.* Assistant Professor KROHN.

6. Pedagogical Seminary.—This is conducted in a somewhat informal manner. The discussions are based upon articles in the current numbers of such magazines, as the Educational Review, Academy, Pedagogical Seminary, and School Review. *Spring term, half study.* Assistant Professor KROHN.

Open only to students who have taken two of the other pedagogical courses above outlined.

POLITICAL ECONOMY.

1. Political Economy.—At present a single term's work is given in this subject, devoted to the study of standard text-books and to assigned reading. *Spring term, full study.* Professor CRAWFORD.

Required: Two years of University work.

HISTORY.

The study of history extends through the junior and senior years and includes general history, the history of civilization, and the history of the English and United States constitutions. The work of the two years is intended to be continuous, each term being helped by the one preceding; but the study of the constitutional history of the United States is arranged separately for students who have not had the course in general history. The work of the course is presented by text-books, topics, and lectures, and it is desired that students should obtain a considerable acquaintance with historical writers as well as facts.

1. General History.—Three terms are given to general history (some previous knowledge of the subject being assumed), in tracing the outlines of the world's progress from the first appearance of civilization. The work is intended to be much more than an outline, however, and cause and effect, the philosophy of history, are carefully looked to as preparing the way for the special study of the history of civilization which follows. *Fall, winter, and spring terms, full study.* Professor CRAWFORD.

2. History of Civilization.—In this subject the early state of mankind and the history of progress from that state on through the Greek and Roman periods is presented in lectures, followed by a consideration of the civilization of modern Europe on the basis of Guizot's Lectures. References are made to a considerable range of literature, and essays on various topics are required. *Fall term, full study.* Professor CRAWFORD.

   Required: History, 1.

3. Constitutional History.—In the first term the time is given to an historical study of the English constitution with special reference to principles and precedents belonging equally to modern England and the United States. In the second term an historical and critical study is made of the constitution of the United States. *Winter and spring terms, full study.* Professor CRAWFORD.

   Required: History, 1.

4. Constitutional History.—For students who have not had the work in general history, a term is arranged giving a brief sketch of the principles of English government, and a study of the constitution of the United States. *Winter term, full study.* Professor CRAWFORD.

THE CLASSICS.

The purpose of the instruction in this department may be stated as follows: First, to acquaint the student with the principles of the languages themselves. Much stress is laid upon the fact that the laws of syntax are the laws of mental operation, and that a proper regard for the logical order of thought must lend help to translation. Extemporaneous translations are required throughout the course as furnishing the most available application, under the stimulus of the class room, of the purpose enunciated. A second purpose is to employ the literature read as a basis for the consideration of those numerous problems of life and civilization which the Greeks and Romans attempted to solve. The debt of

present civilization to the classic world is so large and so varied that abundant opportunity is afforded for a fruitful study of the growth and descent of ideas and institutions. Conversations upon the governmental, moral, educational, and esthetic ideas of the ancients are used to elucidate these questions, and students are required to use the library, and the numerous photographs and other apparatus of instruction that are at their command for further information in special work to be assigned from time to time.

The two purposes are, then, to deal rationally with language as language, and to make this study a fruitful source of information upon questions that must concern every thoughtful person.

GREEK.

1. Selections from Herodotus.—Special studies in verb syntax. Ionic etymology. Greek prose. *Mather. Fall term, full study.* Professor Moss.

2. Selections from Xenophon's Hellenica.—Studies in syntax. Greek prose. Consideration of the causes of the downfall of Athens. *Manatt. Winter term, full study.* Professor Moss.
   Required: Greek, 1.

3. Xenophon's Memorabilia.—Studies in syntax. Consideration of the work of Socrates as a public teacher. *Winans. Spring term, full study.* Professor Moss.
   Required: Greek, 1, 2.

4. Selections from the Orations of Lysias and Demosthenes.—Comparative study of the syntax of the two authors. Discussions upon the development of Greek oratory. *Stevens; Tyler; Tarbell. Fall term, full study.* Professor Moss.
   Required: Greek, 1, 2, 3.

5. Plato's Apology; and Selections from the Phaedo.—Studies in the rhetoric and idiom of Plato. Outline of his philosophical views, so far as touched upon in the text read. *Wagner. Winter term, full study.* Professor Moss.
   Required: Greek, 1, 2, 3, 4.

6. Aeschylus's Prometheus Bound, and Euripides' Alcestis.—Studies in the history and characteristics of the Greek drama. *Prickard; Jerram. Spring term, full study.* Professor Moss.
   Required: Greek, 1, 2, 3, 4, 5.

7. Lyric Poets.—Studies in the social character of lyric poetry. *Bucholz. Fall term, full study.* Professor Moss.
   Required: Greek, 1, 2, 3, 4, 5, 6.

8. Seminary.—Thucydides. Papers on historical, economical, and civil questions connected with the rise of the Athenian power. *Winter term, full study.* Professor Moss.
   Required: Greek, 1, 2, 3, 4, 5, 6, 7.

9. Seminary.—Homer. Papers on the civilization represented in the poems. Lectures on the interpretive character of the Illiad and Odyssy. *Spring term, full study.* Professor Moss.
   Required: Greek, 1, 2, 3, 4, 5, 6, 7, 8.

LATIN.

1 (a) Livy.—Selections from the XXI. and XXII. books. A study of Hannibal and of the military systems of the times. A thorough review of syntax, with a careful study of subjunctives.
   (b) Prose Composition.—The work is based on Livy, and that author's text in representative passages is made the subject of careful analysis. The writing is based on this analysis. *Fall term, full study.* Professor BARTON.

2. Cicero de Amicitia.—An introduction is here made to the philosophical systems of the Romans. *Winter term, full study.* Professor BARTON.
   Required: Latin, 1.

3. Horace. Selections from the Odes.—The metres are carefully studied. The selections are designed to bring into prominence the beauty of the poet. *Spring term, full study.* Professor BARTON.
   Required: Latin, 1, 2.

4. Tusculan Disputations.—The first book of the Disputations is read together with extracts from Cato Major, de Senectute, and Scipio's Dream. *Fall term, full study.* Professor BARTON.
   Required: Latin, 1, 2, 3.

5. Horace's Satires. Selections.—A careful study is made of the social life of the Romans. *Winter term, full study.* Professor BARTON.
   Required: Latin, 1, 2, 3.

6. Tacitus. The Germania and Agricola. Roman Archaeology.—*Spring term, full study.* Professor BARTON.
   Required: Latin, 1, 2, 3.

7. Quintilian.—Selections from the X. and XII. books. The whole field of classical literature is studied and reviewed. *Fall term, full study.* Professor BARTON.
Required: Latin, 1, 2, 3.

8. Juvenal's Satires.—Especial reference to the private life of the Romans. *Winter term, full study.* Professor BARTON.
Required: Latin, 1, 2, 3.

9. Cicero de Officiis.—In this connection a study of the ethics of the Roman world. *Spring term, full study.* Professor BARTON.
Required: Latin, 1, 2, 3.

ENGLISH LANGUAGE AND LITERATURE.

The work of this department during the first two years consists of the study of the literature, with the exception of one hour a week in the freshman year devoted to higher English grammar. During the last two years the time is divided between literature and language. English 1 and 2 are required for the degree of B. L.

A special course in literature of one year, is offered to scientific and engineering students.

1. (*a*) General Survey of English Literature.—Four hours a week. (*b*) Higher English Grammar. One hour a week. *Fall, winter, and spring terms, full study.* Assistant Professor MERRILL.

2. Shakspere.—Two hours a week. Professor DODGE. History of the Drama. One hour a week. Professor DODGE. Prose writers from Johnson to Ruskin. Two hours a week. *Fall, winter, and spring terms, full study.* Assistant Professor MERRILL.
Required: English, 1.

3. Poetry of the 19th century. — Two hours a week. Assistant Professor MERRILL. Old and early English. Two hours a week. Professor DODGE. *Fall, winter, and spring terms, full study.*
Required: English, 2; French, or German, 1.

4. Eighteenth Century Prose.—Fall and winter terms. Literary Study of History. Spring term, 2 hours a week. Early English continued. Fall term. Chaucer's Canterbury Tales. Winter and spring terms, 3 hours a week. *The whole, a full study.* Professor DODGE.
Required: English, 3; French, or German, 1.

5. Special course for Scientific Students.—General Survey of English Literature. Fall and winter terms. Study of Scientific Prose. Spring term. Higher English Grammar. One hour a week throughout the year. *The whole, a full study.* Professor DODGE.

GERMAN.

There are three years of instruction given in German. The first is devoted to the study of grammar. In the second a select course of reading is followed with exercises in composition and conversation. In the third the study is conducted in German; the history of literature is studied from a manual and by lectures, accompanied by critical reading of classic and latest authors.

1. For Students in College of Literature.—*Joynes-Meissner German Grammar; Joyne's German Reader; Fall, winter, and spring terms, full study.* Professor SNYDER.

2. For Students in College of Literature.—Reading, composition, and conversation. Harris's German Composition, White's German Prose, and a selection of Classics. Gœthe's Iphigenie, or Hermann and Dorothea; Schiller's Maria Stuart, Wilhelm Tell, or Jungfrau von Orleans, etc. Also selections of modern prose. Freitag's Aus dem Staate Friedrichs des Grossen; Jensen die Braune Erica; Fouqué's Undine, etc. *Fall, winter, and spring terms, full study.* Professor SNYDER.

   Required: German, 1.

3. For Students in College of Literature.—The study in this year is conducted in German. History of German Literature, with lectures. Assigned reading and reports thereon. Texts, Gœthe's Faust (1st part), and Torquato Tasso; Lessing's Nathan der Weise, or Minna von Barnhelm; Schiller's Wallenstein; Buchheim's Deutsche Lyrik, and selections from modern authors. *Fall, winter, and spring terms, full study.* Professor SNYDER.

   Required: German, 1, 2.

4. Special one year's course for students in Colleges of Agriculture, Engineering and Science. *Otis's German Grammar; Joyne's Reader; Hodges's German Science Reader. Fall, winter, and spring terms, full study.* Assistant Professor MERRILL and Mr. PIATT.

5. Special Scientific Readings.—Equivalent of German 2 in the winter and spring terms. *Gore's Science Readings: Seidensticker's Scientific Monographs; and assigned readings. Winter and Spring terms, full study.* Professor SNYDER.

French.

Of the four courses provided in this subject the first three are intended for students of the language as such; the other for those who especially wish to make use of French in the prosecution of other studies. The former are mainly for students in literary courses and constitute three years of progressive work; the fourth course is for those whose chief attention is given to technical and scientific subjects.

1. For Students in College of Literature.—The course begins with a study of grammatical constructions, with exercises upon pronunciation, and with easy translations from French into English. As the work progresses greater attention is paid to grammatical rules and their applications and translations from English into French are required. Conversation is introduced as soon as the way opens. Careful attention is given to French pronunciation. *Super's Reader; Souvestre's Confessions d'un Ouvrier; Sandeau's M'lle de La Seiglière. Fall, winter, and spring terms, full study.* Professor Paradis.

2. For Students in College of Literature.—This is a second year's work for those who have had course 1. It consists of readings and translations of various selections from classical and modern writers, with a further study of syntax, of idioms, etc., and with exercises in composition and conversation. Essays in French are required. *Fall, winter, and spring terms, full study.* Professor Paradis.
   Required: French, 1.

3. For Students in College of Literature.—This is a third year's study following courses 1 and 2 and is elective by students who want to become further proficient in the language and literature. The instruction is given in French. *Fall, winter, and spring terms, full study.* Professor Paradis.
   Required: French, 1, 2.

4. For students in Colleges of Agriculture, Engineering, and Science.—This is similar to course 1; but less attention is given to grammar and more to translation from French into English, in order that students may learn to read at sight works in various departments of science and art. *Super's Reader; Souvestre's Confessions d'un Ouvrier; Sandeau's M'lle de La Seiglière. Fall, winter, and spring terms, full study.* Professor Paradis and Mr. Piatt.

Italian.

1. Italian.—Selected readings, composition, and conversational exercises. *Grandgent's Italian Grammar and Reader; Readings from modern authors; DeAmici's Camilla, or Cuore. Fall, winter, and spring terms, full study.* Professor Snyder.

   Required: French, 1, or 4.

Spanish.

1. Spanish.—Selected readings, composition, and conversational exercises. *Knapp's Spanish Grammar and Reader. Fall, winter, and spring terms, full study.* Professor Paradis.

   Required: French 1, or 4; or Latin, 1, 2, and 3.

Rhetoric and Oratory.

The object of the prescribed courses outlined below is not so much the acquisition of knowledge regarding English as skill in the use of English and in oratorical delivery. They are designed chiefly to furnish the student with the ability to write well and to speak well,—to express his thoughts, both with the pen and with the voice, in a clear, effective manner.

1. Themes and Elocution.—Students from the Colleges of Agriculture, Engineering, and Science do their work in this department during their junior year. No text-book is used; but in order that all practice in writing may be intelligent, a fair working knowledge of the principles of composition is given in lectures. Ten themes are presented by each person, each of which, after correction by the instructor, is handed back to the student to be carefully re-written and returned to the instructor. Further on in the work of the year is included a carefully graded series of twenty lessons in elocution. *Phyfe's How I Should Pronounce. Fall, winter, and spring terms, three-fifths study.* Professor Brownlee.

2. Themes and Elocution.—Students from the College of Literature do the work of this department during the freshman and the senior years. Two hours a week throughout the freshman year are devoted to rhetoric and theme writing. Ten themes are required, and each, after correction, is re-written by the student. One hour a week throughout the senior year is devoted to oratorical delivery. Six lectures are given upon the art of oratory. *Genung's Practical Rhetoric; Webster's Orations. First year, two-fifths study; fourth year, one-fifth study.* Professor Brownlee.

3. Themes and Elocution.—To meet the wants of those desiring a more extended training in elocution and oratory than is furnished by the prescribed course, an elective course is provided. *Fall, winter, and spring terms, two-fifths study.* Professor BROWNLEE.

The following subjects, offered to students in the College of Literature, are described elsewhere as noted:

In College of Engineering—

Mathematics, 1, 3, 5, 7; Astronomy, 1; Physics, 1, 2.

In College of Science—

Chemistry, 1, 3, 4, 5, 9; Mineralogy, 1; Geology, 5 or 1; Meteorology, 1; Botany, 6, or 1 to 4; Zoölogy, 5, or 1, 2, 4; Entomology, 1; Physiology, 1; Anthropology, 1.

CLASSIFICATION OF STUDIES AND REQUIREMENTS FOR GRADUATION.

Forty term credits (including military) constitute the requirement for a degree in literary courses. Every student must take the required subjects (11 terms), must select at least two majors of six terms each (12 terms) and three minors (3 terms) from the restricted electives, and may choose 14 or more subjects from the remaining majors and minors, or from the open electives. For degree of B.A. the two majors must be taken in Greek and Latin; for degree of B.L. the majors may be chosen in English, Latin, German, French, or Pedagogy.

In electing studies students must be careful to observe the preparation required for each, as given under separate subjects.

REQUIRED SUBJECTS.

History—3 credits.
Mathematics—2 credits.
Chemistry—1 credit.
Physics—1 credit.
Themes and Elocution—2 credits.
Military—2 credits.

RESTRICTED ELECTIVES.

MAJORS.

English—6 or 9 credits.
Greek—6 or 9 credits.
Latin—6 or 9 credits.
German—6 or 9 credits.
French—6 or 9 credits.
Pedagogy—6 credits.

MINORS.

Constitutional History—2 credits.
Political Economy—1 credit.
History of Civilization—1 credit.
History of Philosophy—1 credit.
Psychology—1 credit.
Logic—1 credit.

OPEN ELECTIVES.

Italian—3 credits.
Spanish—3 credits.
Oratory—1½ credits.
Art and Design—3 or 6 credits.
Botany—1 to 3, or 6 credits.
Zoölogy—1 to 3, or 6 credits.
Chemistry—3 or 5 credits.
Geology—1 or 3 credits.
Physiology—1 credit.
Mathematics—3 or 6 credits.
Physics—3 credits.
Entomology—2 credits.
Mineralogy—1 credit.
Anthropology and Meteorology—1 credit.
Astronomy—1 credit.

Suggested Courses of Study.

These courses are presented as an aid to election by students. The work of the freshman year should be taken as given in some one of these courses. Electives and specialties ought to be left for the junior and senior years, when the student has gained a more correct estimate of his own powers and preferences, as well as of his ultimate aim in life.

ENGLISH COURSE.

FIRST YEAR.

1. English, 1; Advanced Algebra; Latin, German, or French; Themes; Military.
2. English, 1; Trigonometry; Latin, German, or French; Themes; Military.
3. English, 1; Astronomy, or Mathematics; Latin, German, or French; Themes; Military.

SECOND YEAR.

1. English, 2; Physiology; German or French; Military.
2. English, 2; Physics; German or French; Military.
3. English, 2; Botany; German or French; Military.

THIRD YEAR.

1. English, 3; History; Chemistry, 1.
2. English, 3; History; Zoölogy.
3. English, 3; History; Geology.

FOURTH YEAR.

1. English, 4; Psychology; History of Civilization; Elocution.
2. English, 4; Logic; Constitutional History (England); Elocution.
3. English, 4; Political Economy; History of Philosophy, or Constitutional History (U. S.); Elocution.

MODERN LANGUAGE COURSE.

FIRST YEAR.

1. French, 1; English, 1, or Latin; Advanced Algebra; Themes; Military.
2. French, 1; English, 1, or Latin; Trigonometry; Themes; Military.
3. French, 1; English, 1, or Latin; Astronomy, or Mathematics; Themes; Military.

SECOND YEAR.

1. French, 2; German, 1; Physiology; Military.
2. French, 2; German, 1; Physics; Military.
3. French, 2; German, 1; Botany; Military.

THIRD YEAR.

1. German, 2; History; Chemistry, 1.
2. German, 2; History; Zoölogy.
3. German, 2; History; Geology.

FOURTH YEAR.

1. English 4, Italian, Spanish, or German, 3; Psychology; History of Civilization; Elocution.
2. English, 4, Italian, Spanish, or German, 3; Logic; Constitutional History; Elocution.
3. English 4, Italian, Spanish, or German, 3; Political Economy; History of Philosophy; Elocution.

LATIN COURSE.

FIRST YEAR.

1. Latin; German, or French; Advanced Algebra; Theme Writing; Military.
2. Latin; German, or French; Trigonometry; Theme Writing; Military.
3. Latin; German, or French; Astronomy, or Mathematics; Theme Writing; Military.

SECOND YEAR.

1. Latin; German, or French; Physiology; Military.
2. Latin; German, or French; Physics; Military.
3. Latin; German, or French; Botany; Military.

THIRD YEAR.

1. Latin; History; Chemistry.
2. Latin; History; Zoölogy.
3. Latin; History; Geology.

FOURTH YEAR.

1. History of Civilization; Psychology; English 4, German, or French; Elocution.
2. Constitutional History; Logic; English 4, German, or French; Elocution.
3. Political Economy; Constitutional History, or History of Philosophy; English 4, German, or French; Elocution.

CLASSICAL COURSE.*

(With maximum of Science.)

FIRST YEAR.

1. Greek; Latin; Advanced Algebra; Themes; Military.
2. Greek; Latin; Trigonometry; Themes; Military.
3. Greek; Latin; Astronomy, or Mathematics; Themes; Military.

SECOND YEAR.

1. Greek; Latin; Physiology; Military.
2. Greek; Latin; Physics; Military.
3. Greek; Latin; Botany; Military.

THIRD YEAR.

1. Greek; History; Chemistry.
2. Greek; History; Chemistry.
3. Greek; History; Chemistry.

FOURTH YEAR.

1. German, or French; Psychology; English, 4; Elocution.
2. German, or French; Logic; English, 4; Elocution.
3. German, or French; Political Economy; English, 4; Elocution.

CLASSICAL COURSE.

(With maximum of modern language, or Pedagogy.)

FIRST YEAR.

1. Greek; Latin; Advanced Algebra; Themes; Military.
2. Greek; Latin; Trigonometry; Themes; Military.
3. Greek; Latin; Astronomy, or Mathematics; Themes; Military.

SECOND YEAR.

1. Greek; Latin; Physiology; Military.
2. Greek; Latin; Physics; Military.
3. Greek; Latin; Botany; Military.

THIRD YEAR.

1. German, or Psychology; History; Chemistry.
2. German, or Logic; History; Zoölogy.
3. German, or Philosophy of Education; History; Geology.

FOURTH YEAR.

1. German, or French; Educational Psychology; History of Civilization; Elocution.
2. German, or French; Ethics; Constitutional History; Elocution.
3. German, or French; School Supervision, or Political Economy; History of Philosophy, or Constitutional History (U. S.); Elocution.

PHILOSOPHY AND PEDAGOGY.

The first and second years of this course may be those of any course in the College of Literature.

THIRD YEAR.

1. Psychology; Chemistry, or History; Latin, German or French.
2. Logic; Zoölogy, or History; Latin, German, or French.
3. Philosophy of Education; Geology, or History; Latin, German, or French.

FOURTH YEAR.

1. History of Education; Educational Psychology; History of Civilization; English, 4 (half course); Elocution.
2. School Hygiene; Constitutional History (England); English, 4 (half course); Elocution.
3. School Supervision; Pedagogical Seminary; Political Economy, or Constitutional History (U. S.); English, 4 (half course); Elocution.

SCHOOL OF ART AND DESIGN.

Professor Frank Forrest Frederick.
Edith Adelaide Shattuck.

This school subserves a twofold purpose. (1) It affords to the students of the several colleges the opportunity to acquire such a knowledge of free hand drawing as their chosen courses may require. (2) It offers to such as have a talent or taste for art the best facilities for pursuing studies in industrial designing or other branches of fine art.

Special students, not otherwise connected with the University, may enter this school upon payment of very moderate fees.

In all courses the work is made of direct benefit to the students in other lines, and at the same time it aims to develop in them a love for, and an appreciation, of the beautiful.

Work must be taken at the times indicated below and all students must satisfactorily complete the requirements of each term before taking up that of the next.

Equipment and Facilities.

The art gallery is of much use to students of this school. A description of this is given on page 22. The school owns a large number of casts of ornament from the Alhambra and other Spanish buildings, presented by the Spanish government. Also another valuable set of casts from Germany, illustrating German Renaissance ornament. In addition the school owns all the casts and models usually found in an art school, together with a large number of objects for still life. Students have the use of the collection of American and foreign drawings and photographs, numbering several thousands, belonging to the department of architecture, and of the University library which is particularly rich in works on art. The principal English and American art magazines are found in the reading room.

COURSES OF STUDY.

1. For Special Students of Art and Design.—First year, first term. Principles of free hand drawing learned from drawing geometric solids (*a*) in outline, (*b*) in washes of water color, (*c*) in values of charcoal.

Second term. Principles applied by drawing (*a*) groups of common objects, as books, vases, chairs, tables, etc.; (*b*) casts of ornament; (*c*) interior, as the corner of the room; (*d*) plants and flowers from nature.

Third term. Study of anatomy, usings Duval's Artistic Anatomy as text book, and drawing from Rimmer's Art Anatomy and Julien's Études D'Aprés l'Antique. Also outline drawing from the antique figure, and shaded drawings in charcoal of details of the human figure and animal forms.

Lectures are given throughout the year on design and the historic styles of ornament. Students are required to prepare (*a*) a monograph of the ancient mediaeval or modern styles, (*b*) original exercises showing principles and methods, (*c*) original exercises employing color.

Lectures on perspective are given the second term and the problems then worked out are illustrated by sketches from nature made during the third term.

Second year, first term. Modeling in clay (*a*) details of human face, (*b*) copy of cast of ornament, (*c*) ornament from photograph. Casts are made of (*a*) at least one modeled piece, (*b*) arm, hand, or foot from nature, (*c*) foliage, fruit, or vegetable from nature.

Second term. Painting in oil color: (*a*) study in monochrome from still life; (*b*) group, as a study for composition and color.

Third term. Painting in water color: (*a*) group, as a study for composition and color; (*b*) flower and foliage from nature; (*c*) sketching from nature.

Design. (*a*) An original design for capital, panel, or spandrel—modeled and cast. (*b*) An original design for surface decoration in color.

Third year, first term. Advanced work in oil and water color painting, and sketching from nature in color.

Second term. Modeling (*a*) bas-relief from antique figure, (*b*) anatomical rendering of an antique figure, (*c*) bust from the antique, (*d*) portrait head from nature in round or relief.

Third term. (*a*) Shaded study of antique figure. (*b*) Portrait head from nature. (*c*) Sketching from nature in color.

Design. Details comprising the human, animal, plant, and insect forms for the purpose of design, and an original practical design employing part of this material. *Three years, double study.* Professor FREDERICK.

2. For Students of Design.—First term, same as work in design of course 1; also study of the relation of design to manufacture.

Second term. Study of color as a means of interior and exterior decoration. At least one color scheme to be worked out, full size, in tempera colors.

Third term. Practice in designing in the line of work of which the student wishes to make specialty. *One year, double study.* Professor FREDERICK.

Required: Art and Design, 1, first two years.

3. For Students of Architecture.—First year, first term, same as first term of course 1. Second term, same as course 1, except that special attention is given to the drawing of casts of ornament and interiors.

Third term, rendering perspectives in washes of water color (sepia). Sketching from nature. *Frederick's Architectural Rendering in Sepia.*

Design, same as in course 1.

Perspective, same as in course 1.

Instruction in pen etching is given throughout the year, but most of the work must be done out of hours. *Gregg's Architectural Rendering in Pen and Ink.*

Second year, first term, same as in course 1. Second term, same as in course 1; or as in second term, third year, course 1; or as in second term, third year, course 2. Third term, same as in course 1; or as in third term, third year of course 1.

Design, same as in course 1. *Two years, full study.* Professor FREDERICK.

4 For students in College of Agriculture, and School of Natural Science—First term, same as in course 1. Second term, same as in course 1, except that special attention is given to drawing plant and animal forms from nature. Third term, use of pen and ink and water color in work relating to these courses.

Design, same as in course 1. *One year, full study.* Professor FREDERICK.

5. For Students of Mechanical, Electrical, and Civil Engineering and of Chemistry.—First term, same as in course 1. Second term, same as in course 1, except that special attention is given to drawing details of machinery and chemical apparatus. *Fall and winter terms, full study.* Professor FREDERICK.

6. For Students in College of Literature.—The work in this course is the same as course 1, as far as time will allow, including design. Students are required to attend the lectures of course 7. *One or two years, full study.* Professor FREDERICK.

7. Course in the History of Art.—Lectures with collateral reading. Selections from Ruskin, Sir Joshua Reynolds, Viollet le Duc, Day's Work on Ornament, Penot and Chipiez' and Reber's histories of art, and other works relating to the history and methods of painting, sculpture, and architecture.

These lectures are illustrated by several hundred lantern slides and are open to all students of the department. *Winter term, once a week.* Professor FREDERICK.

THE BATTALION

SCHOOL OF MILITARY SCIENCE.

Professor Elbridge R. Hills,
Captain 5th Artillery, U.S.A.

The military instruction is under the charge of a graduate of the U. S. Military Academy, and an officer of the regular army of the United States. The course as a whole has special reference to the duties of officers of the line. A full supply of arms and ammunition is furnished by the War Department, including 300 cadet rifles and accoutrements, and two field pieces of artillery. Ammunition is supplied for the practice and target firing and for artillery use.

Every male student, able to perform military duty and not excused for sufficient cause, is required to drill twice each week until he has gained six creditable term records. He is also required to study the Drill Regulations for Infantry and to recite upon the same once a week until he passes two creditable term examinations. This practical instruction begins as soon as possible after he enters the University; but a preparatory student, carrying no freshman studies and not expecting to matriculate during the year, is not permitted to drill. The standings in study and drill are placed on record, with other class credits; two terms of recitations and drill count one credit, and the four remaining terms of drill another, and are requisite to graduation in every University course.

Appointments in the battalion are made on nomination by the professor in charge and confirmation by the Faculty.

Students who have passed two examinations in the drill regulations and who have gained two term credits in drill practice are eligible for corporals; those having three term credits in each are eligible for sergeants; and those having six term credits in each, for lieutenants and for officers of higher rank.

The battalion (four companies) is composed mainly of the members of the freshman and sophomore classes; the first supplying the corporals, the second, the sergeants, while the captains and lieutenants are taken from those of the junior class who have passed through the lower grades satisfactorily.

A special military scholarship, good for one year, is open to each student who attains the grade of a commissioned officer, the value of which is paid the holder at the close of the year.

An artillery detachment is organized mainly from the second year or sophomore class, which receives practical instruction twice each week during the college year.

Towards the close of the spring term, a committee appointed by the Faculty examines candidates for nomination to the governor of the state to receive commissions as brevet captains in the state militia. Candidates must be members of the senior class in full standing at the time of this examination; must have completed the course of military studies; must have served three terms as captains or lieutenants, and must be approved by the Faculty, as having good reputations as scholars, officers, and gentlemen.

Under the authority of the acts of incorporation, the Trustees have prescribed a uniform of cadet gray, with black cloth trimming, cut after the pattern prescribed by the U. S. Army Regulations; members of the band to wear the usual additional trimmings. The uniform of the commissioned officers is that of officers of the same grade in the National Guard. All members of the battalion wear the University badge on the cap. Uniforms must be procured within one month after entering upon military duty, and must be worn at all military formations.

The University Cornet Band is composed of students, and every full term of service therein is counted as one term of drill.

COURSES IN MILITARY SCIENCE.

1. Drill Regulations.—For all male students. School of the soldier; school of the company in close and in extended order; bayonet exercise. *Fall and winter terms, one-fifth study.* Professor HILLS.

2. Drill Practice.—For all male students. *Six terms, two-fifths study.* Professor HILLS.

3. Recitation and Practice for Military Class.—(*a*) School of the battalion: close and extended order: artillery drill.

   (*b*) Ceremonies, review, and inspection; military signaling; sword exercise; artillery drill.

   (*c*) Guard, outpost, and picket duty; military signaling; artillery drill.

   (*d*) Military administration; reports and returns; theory of fire arms; target practice.

   (*e*) Organization of armies; field fortifications; art of war. *Seven terms, recitations, 1 to 2 hours a week; drill, 2 hours a week.* Professor HILLS.

MUSIC.

GUISEPPE NAPOLEONE CAROZZI.

Music constitutes no part of any University course of studies, and is, therefore, not provided by the Trustees. But, as many students desire instruction in music, competent teachers are selected by the Trustees, and rooms are set apart for the purpose. Instruction in vocal music and voice culture is given to individuals and to classes.

TUITION.

Piano instruction ten weeks—2 lessons a week	$15 00
Ten weeks—1 lesson a week	8 00
Use of piano, one hour daily, per term	2 00
Vocal instruction ten weeks—2 lessons a week	20 00
Ten weeks—1 lesson a week	12 00

No deduction on account of absence in either course, except in case of protracted illness.

Special students in music will also be charged the regular term fee charged other students of the University.

PRIZES AND SCHOLARSHIPS.

THE CONKLIN ORATORICAL PRIZES.

Mr. R. R. Conklin, an alumnus of the University, has offered two prizes, of $60 and $40, respectively, for original orations from juniors, to be pronounced at such time as the Faculty may appoint during the week of commencement. Competition is open to such as are full members of the junior class. From the orations submitted on or before the 17th day of April, a number, not to exceed ten, to be selected by the Faculty, will be presented on the platform, and to the first and second best, as may be determined by judges, the prizes will be awarded.

THE HAZLETON PRIZE MEDAL.

Capt. W. C. Hazleton provided a medal, of beautiful and artistic design, which is to be awarded at a competive drill to be held near the close of the year, to the best drilled student. Each competitor must have been in attendance at the University for at least sixteen weeks of the current college year; must not have had more than four unexcused absences from drill; and must present himself for competition in full uniform.

The award will be made on the following points:

1. Erectness of carriage, military appearance, and neatness.
2. Execution of the school of the soldier, without arms.
3. Manual of arms, with and without numbers.

The successful competitor will receive a certificate setting forth the facts, and may wear the medal until the 15th day of May following, when it will be returned for the next competition.

HONORARY SCHOLARSHIPS.

Provision has been made for one honorary scholarship for each county in the state. The holder of the scholarship may attend the University for four years, under proper regulations, free of charge for tuition or incidental expenses. The total value of this scholarship is $90.

Several of these scholarships are already occupied. The vacancies in other counties will be filled as follows:

Examinations are to be held in the several counties, under the supervision of the county superintendents thereof, on the second Friday and Saturday of June, at such places as the superintendents may select. Candidates for the examination must be approved in the common English branches by the superintendents. Questions will be furnished from the University, and the answers, in writing, will be sent to the University for judgment. The scholarship will be awarded to the candidate who passes the best examination, provided he has a standing in each subject of not less than 75, and an average standing on all the subjects of not less than 80, per cent.

Each pupil who enters the examination may choose whether he will be examined to enter upon a course in the Colleges of Agriculture, Engineering, or Science, or one of the courses in the College of Literature.

In the first case, the subjects of his examination will be algebra, geometry, physiology, botany, natural philosophy, and English rhetoric.

In the second case, the subjects will be algebra, geometry, botany, or natural philosophy, three books of Cæsar, five orations of Cicero, and six books of the Aeneid.

The two classes of examinations are intended to be as nearly equivalent as possible, and to conform to the requirements stated under the head, *Examinations for Admission*, p. 149. It is essential that the examinations in the counties be held at the time named above, publicly, and with reasonable notice; requests for special or private examinations can not be considered.

ACCREDITED SCHOOL SCHOLARSHIPS.

Scholarships in the University are offered to high schools on its accredited list, one a year to each school, upon the same terms and subject to the same conditions as the HONORARY SCHOLARSHIPS heretofore established, *except as noted below:*

1. Examinations for the *accredited school scholarships* will be held at the several accredited schools, by the principals thereof, on the third Thursday and Friday in May.

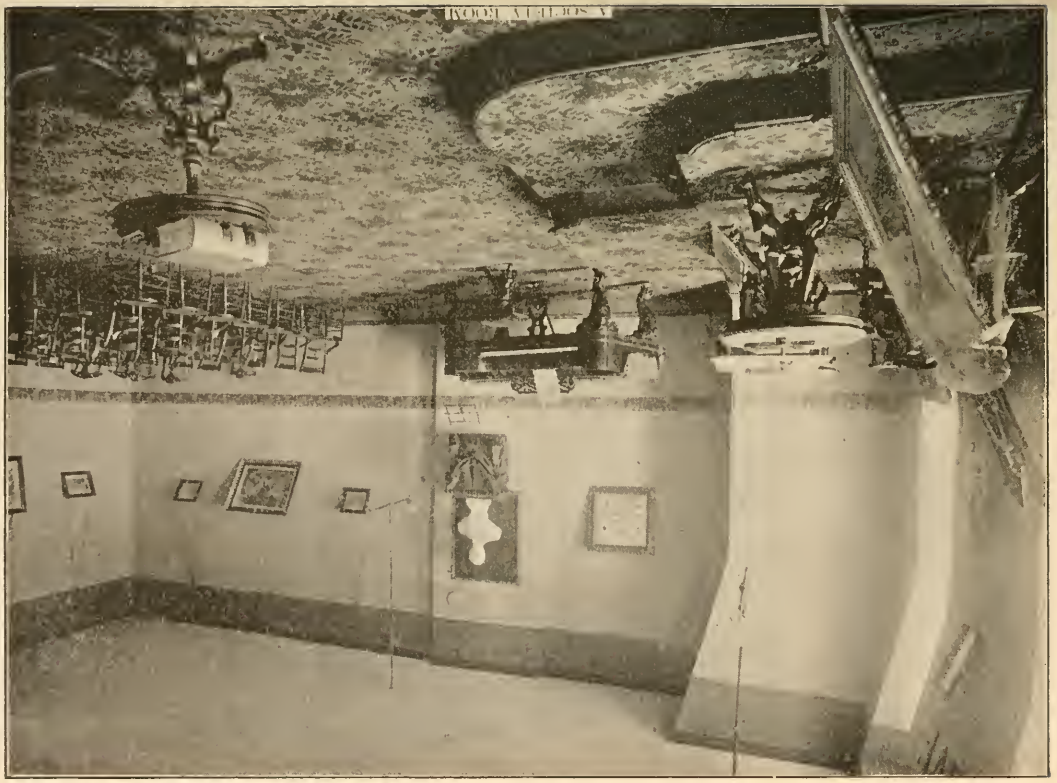
2. There need be no advertisement of the examination, further than by principals to all pupils eligible to pass the same.

3. The term of each scholarship will be for the two school years next after the examination upon which it was awarded, and vacancies will not be filled, except that if any person to whom a scholarship has been awarded shall be unable to accept the same, then the next highest in the competition may be awarded the scholarship.

4. Scholarships will be awarded on these examinations to such persons only as shall be full graduates of their several accredited schools, either of the current or some preceding year.

CHICAGO CLUB LOAN FUND.

The CHICAGO CLUB OF THE UNIVERSITY OF ILLINOIS offers two loans of $250.00 each, payable to the beneficiary, $100.00 the first year, $75.00 the second year, $50.00 the third year, and $25.00 the fourth year. The loans are offered to residents of Cook County, Illinois, only, and are to be awarded upon competitive examination to those obtaining the highest average grades. The loans are due six years after matriculation. They bear no interest while the student is in school, but six per cent. after graduation. The examination questions are prepared at the University and cover the same subjects as those for the honorary scholarships.



MILITARY SCHOLARSHIPS.

Students who have gained six term credits in class room military instruction and six such credits in drill practice are eligible for appointment as commissioned officers of the battalion. Those attaining this rank may have awarded them special scholarships, good for one year and equal in value to the University term fees for the same length of time.

FELLOWSHIPS.

Four fellowships, each of $400 a year, are offered to members of the Graduate School, in connection with which further particulars in regard to them are given.

SOCIETIES.

The Literary Societies have from the opening of the University enjoyed its fostering care.

The ADELPHIC and PHILOMATHEAN societies, for men, and the ALETHENAI, for women, occupy spacious halls, which the members have furnished and decorated with taste and elegance. Meetings are held Friday evenings throughout the term time, are well attended, and are maintained with unflagging interest. They furnish excellent drill in writing, speaking, and parliamentary methods.

Both the YOUNG MEN'S and YOUNG WOMEN'S CHRISTIAN ASSOCIATIONS are active and useful organizations and have a large membership.

Special organizations unite the students of NATURAL HISTORY, of CIVIL ENGINEERING, of MECHANICAL ENGINEERING, of ARCHITECTURE, of AGRICULTURE, and of CHEMISTRY, and in ATHLETICS.

GRADUATE SCHOOL.

Instruction and the facilities of advanced study and research are now offered to the graduates of this and of other colleges and universities without fees or payment of any kind, except for actual laboratory expenses. The diploma of any college or university in good standing is accepted for admission, instead of entrance examinations. No formal courses of study are prescribed, but special arrangements are made to

meet as nearly as practicable the wishes of each applicant. Such students do not attend regular recitations or lectures unless they also take some undergraduate work, in which case they conform to the usages of the class attended, and pay the regular fees. They may be requested to give one or more class lectures in the line of their special studies. A second degree is awarded upon the completion of the required studies and the presentation of an accepted thesis. The general requirements for degrees may be found elsewhere under the proper heading.

FELLOWSHIPS.

The University offers four fellowships, open to graduates of this or other similar institutions, conditioned upon required qualifications and a designated amount of service to the University. Each fellowship is good for one year and has a money value of $400.00, payable in ten monthly installments. Appointments to these fellowships are made upon the grounds of good character, high attainments, promise of distinguished success in the line of studies chosen, and of usefulness to the University. The holders of the fellowships are required to give instruction in assigned subjects 5 to 10 hours a week during the year. The time remaining is to be devoted to graduate study; and, upon the completion of a prescribed course and the presentation of a proper thesis, a second degree is awarded.

UNIVERSITY EXTENSION.

The University offers a series of lecture courses by members of the Faculty upon a considerable number of the subjects taught by them. It is an extension of University instruction to people at their homes who cannot attend the institution itself as students, but yet desire the information that such students gain. In the endeavor to make the University doubly useful to the people of the state, the professors hold themselves in readiness to lecture upon invitation in any accessible locality, if consistent with regular duties. The subjects and lectures are the same as at the University, so that there is a real extension of its teaching. The course upon a single subject usually consists of six lectures, one given each week and commonly upon Friday or Saturday evening. For each lecture there is distributed a printed syllabus or outline giving also

directions to the best literature upon the subject, and other information. The lectures are preceded or followed by reviews, quizzes, and discussions; and at the end of the course an examination may be held. To those satisfactorily passing such examinations a special certificate is issued in the name of the University, and the proper records are made upon its books.

A special series of lectures has been arranged for teachers' summer institutes. These are not intended to take the place of the ordinary instruction given in such institutes, but to present University subjects, by University methods, as far as possible, with all the aids of illustrative and demonstrative equipments.

A special circular giving the subjects and lectures for each academic year is issued during the early autumn and is sent on application. The announcements for the year 1892-93 were as follows:

Botany, Professor Burrill; History of Civilization, Professor Crawford; Mediæval History, Professor Crawford; Agriculture, Professor Morrow; Oratory, Professor Brownlee; Composition, Professor Brownlee; Physiology, Professor Rolfe; Geology, Professor Rolfe; Chemistry, Professor Palmer; Water Supply, Professor Palmer; History of Art, Professor Frederick; Chemistry of the Household, Professor Parr; Applications of Chemical Investigations to Practical Agriculture, Mr. Farrington; The Early History of Illinois, the Local and State Government, Professor Barton; Greek Literature, Professor Moss; English Life and Literature in the Nineteenth Century, Professor Dodge; History of the English Language, Professor Dodge; English Literature, Some Prose Writers of the Nineteenth Century, Professor Merrill; Electricity, Professor Shea; Experimental and Physiological Psychology, Professor Krohn; Astronomy, Professor Myers.

REGULATIONS AND ADMINISTRATION.

ADMISSION.

Examinations of candidates for admission to the University, or to any of its departments, are held at the University itself, on the two days previous to the opening of each term, and at other times and places specially announced.

Applicants must be at least fifteen years of age, and it is considered desirable that they be three to five years older than this. They must pass the required examinations, and must pay the prescribed fees. No distinction is made in regard to sex, nativity, color, or place of residence. Entrance may be made at any time, provided the candidate is competent to take up the work of the classes then in progress; but it is very much better to begin upon the first collegiate day in September, when a large number of the classes are organized, several of them to continue during the year. Satisfactory entrance may usually be made at the beginning of the winter term.

The engineer and architect should be adepts in the various departments of drawing, and some previous study of this branch will be of great advantage. Faunce's Mechanical Drawing is recommended as a text book, and the drawings should be made on smooth paper, eight by ten inches, then inked properly.

ENTRANCE EXAMINATIONS.

The subjects upon which entrance examinations are held are numbered and described in the list given below. Those required for the several colleges and courses are designated by the groups of numbers corresponding to the subjects in the list. The physics, physiology and botany described are each required as preparatory to these subjects as taught in this University. The text-books are named only to aid in showing the requirements. Equivalents are accepted.

1. For the Preparatory Classes.—Subjects, 1, 2, 3, 4.

2. For the Colleges of Agriculture, Engineering, and Science.—Subjects, 1, 2, 3, 4, 5, 6, 7, and any three from 12, 13, 14, 15, 16, 17, 18.

Instead of the literature part of 5, 10 or 11 will be accepted; but candidates presenting one of these will be required to take one year's advanced language work in his undergraduate course.

3. For the College of Literature.—Subjects, 1, 2, 3, 4, 5, 6, 7, 8, and any three from 12, 13, 14, 15, 16, 17, 18. For those who desire to take courses including Greek, 9 is required and may be presented instead of the three sciences which would otherwise be selected from 12 to 18.

4. For entrance to the University without designation of a particular department.—Subjects 1, 2, 3, 4, 5, 6, 7, and any three from 8, 9, 10, 11, 12, 13, 14, 15, 16, 17, 18. In this case special attention must be paid to the requirements for entrance to particular classes as given above and in connection with the description of the subjects under the several colleges; also to the requirements for a degree, if this is desired.

5. Persons over twenty-one years of age, not candidates for a degree, may be admitted to classes, after satisfying the Regent and professor in charge of the department in which such classes are taught, that they possess the requisite information and ability to pursue profitably, as special students, the chosen subjects. Such students are not matriculated; they pay the fees required of students in the preparatory classes.

SUBJECTS FOR ENTRANCE EXAMINATIONS.

1. ARITHMETIC.—Simple and denominate numbers, metric system of weights and measures, common and decimal fractions, practical measurements, percentage, ratio and proportion. Grammar or high school work.

2. GEOGRAPHY.—Mathematical, physical, and political divisions and natural features of the earth's surface; movements of the air and water, climates, natural and commercial productions, animals and man. Grammar school study.

3. HISTORY.—The most important facts in the history of the United States from the settlement of the country to the present time, but especially the main features of the constitution and the development under it of the republic and of the states. Grammar or high school study.

4. ENGLISH GRAMMAR.—The essentials of orthography, etymology, and syntax; including the derivation and composition of words, their

classification as parts of speech, declension and conjugation; sentential analysis, with definition and classification of parts, whether principal or subordinate, whether words, phrases, or clauses. Illustrative words, sentences, etc., may be required as well as the correction of ungrammatical examples.

5. English Composition and Literature.—Correct spelling, capitalization, punctuation, paragraphing; definition and proper use of rhetorical figures; a knowledge of the qualities of style, the kinds of discourse, and the elements of versification; an acquaintance with the masterpieces of English literature. Besides answering questions on the above, the candidates will be required to write an essay of something like 500 words to illustrate his power of using the English language, and his knowledge of the literature. For 1893 these essays will be upon subjects drawn from one or two of the following works: Shakspere's Julius Cæsar; Scott's Marmion, Webster's First Bunker Hill Oration, Goldsmith's Deserted Village, Irving's Sketch Book. For 1894 the works required will be: Shakspere's Merchant of Venice, Scott's Lady of the Lake, Emerson's American Scholar, Longfellow's Evangeline, Macaulay's Second Essay on the Earl of Chatham.

   Real equivalents for any of these works will be accepted.

6. Algebra.—Fundamental operations, factoring, fractions, simple equations, involution and evolution, radicals, quadratic equations and equations reducible to the quadratic form. The subject as given in Wells's University Algebra through quadratic equations, or the same in Wentworth's Algebra.

7. Geometry.—Plane, solid and spherical geometry as given in Wells's Plane and Solid Geometry.

8. Latin.—Three books of Cæsar's Commentaries, five orations of Cicero, six books of Virgil's Aeneid, with scansion of hexameter verse and the translation of English sentences into Latin prose, based on the portions of Cæsar and Cicero above named. This will necessitate a thorough knowledge of the etymology and syntax of Latin grammar.

   Harkness's or Allen and Greenough's Grammar and Collar's Latin Prose Composition are recommended.

   Real equivalents for any of the above mentioned works will be accepted.

   The Roman method of pronunciation is used.

9. Greek.—Greek Grammar (Goodwin's or Hadley's), Greek Prose Composition (Jones's), and four books of Xenophon's Anabasis, or two books of the Anabasis and Herodotus, Mathew's Selections. Writing Greek with the accents will be required.

   The so-called Continental sounds of the vowels and diphthongs and pronunciation according to accent are recommended.

10. French.—Elements of grammar, tested by the correct translation of simple English sentences into French and by questions; reading easy French prose at sight. At least one year's work.

11. German.—Elements of grammar, tested by the correct translation of simple English sentences into German and by questions; reading easy German prose at sight. At least one year's work.

12. Physics.—The elements of physics as given in Gage's Introduction to Physical Science, taught with the use of apparatus for illustration and experiment.

13. Physical Geography.—The subject as presented in Hinman's Eclectic Physical Geography. High school study after the elements of other sciences necessary to the elucidation of the subject have been mastered.

14. Astronomy.—The subject as given in Newcomb and Holden's Astronomy for High Schools and Colleges.

15. Chemistry.—The non-metalic elements as presented in Remsen's Chemistry, Briefer Course. Laboratory practice is essential for the proper preparation in this subject.

16. Physiology.—The anatomy, histology, and physiology of the human body and the essentials of hygiene, taught with the aid of charts and models and demonstrations upon inferior animals, to the extent given in Martin's Human Body, Briefer Course.

17. Botany.—The parts and organs of plants in the descriptive language of the science; the relations of plants to the atmosphere, to temperature, light, soil, etc., to the inferior animals, and to man; characteristics of prominent orders and the determination of species by use of an artifical key. Gray's Lessons and Manual.

18. Zoölogy.—The subject as taught in the best high schools with laboratory facilities. Mere text-book work will not be accepted.

County Superintendents' Certificates.—To prevent loss to those who are not prepared to enter the University, but might come, hoping to pass the examinations for admission, the following arrangement has been made:

County Superintendents of schools will be furnished with questions and instructions for the examination of candidates in the four common branches, arithmetic, geography, English grammar, and history of the United States; applicants who pass creditably will, when they present the superintendent's certificate to that effect, be admitted to the classes of the preliminary year.

Persons who hold teacher's certificates from county superintendents will be admitted to the preliminary class without further examination.

ACCREDITED HIGH SCHOOLS.

The Faculty, after personal examination, appoints accredited high schools, whose graduates may be admitted to the University without further examination within twenty-eight months after the date of their graduation. These must be schools of first-rate character, whose course of instruction includes all the studies required for admission to some one of the colleges of the University. A member of the Faculty will examine a school making application as to its facilities for teaching, its course and methods of instruction, and the general proficiency shown. If the report is favorable, the name of the school is entered in the published list of high schools accredited by the University. The graduates of these schools are admitted to any college to which their high school studies as certified by the principal have prepared them to enter. Annual reports are asked from these schools. A re-examination will be made whenever it may be deemed necessary.

The accredited schools whose graduates are admitted to any of the colleges of the University are the public high schools in

SCHOOLS AND PRINCIPALS.

Auburn Park (Calumet High School) A. S. Hall.
Austin, Helen S. Wyllis.
Belvidere, J. C. Zinser.
Bloomington, Edward Manly.
Cairo, T. C. Clendenen.
Champaign, R. L. Barton.
Chicago, North, O. S. Westcott.
Chicago, South, Jeremiah Slocum.
Chicago, West, Geo. M. Clayberg.
Danville, Joseph Carter.
Decatur, Louis B. Lee.
Dixon, W. H. Williamson.
Aurora, East, E. G. Cooley.
Aurora, West, Kittie Reynolds.
Beardstown, M. Moore.
Bement, J. M. Martin.
Blue Island, C. H. Morrill.
Canton, C. M. Bardwell.
Charleston, Louise Baumberger.
Chicago, Northwest, Franklin P. Fisk.
Clinton, Ia., Julia J. Sweet.
Davenport, Ia., H. H. Roberts.
Delaven, Geo. A. Franklin.
Dundee, S. M. Abbott.

Elgin, H. F. Derr.
Evanston, H. L. Boltwood.
Freeport, R. W. Burton.
Hyde Park, Chas. W. French.
Jersevyille, J. Pike.
Kankakee, C. L. Clippinger.
Kewanee, Horace Phillips.
Lake, E. F. Stearns.
Lincoln, Jane Kidd.
Maywood, C. W. Minard.
Moline, B. C. Caldwell.
Ottawa, J. O. Leslie.
Peoria, A. W. Beasley.
Quincy, W. B. Corbyn.
Rock Island, J. A. Bishop.
Springfield, Wm. W. Helmle.
Taylorville, A. C. Butler.
Urbana, J. W. Hayes.
Englewood, James E. Armstrong.
Farmer City, E. E. Bean.
Galena, Kate McHugh.
Jacksonville, Virginia Graves.
Joliet, F. M. Townsend.
Keokuk, Ia., George F. Marshall.
LaGrange, H. W. Thurston.
Lake View, James H. Norton.
Mattoon, E. Kate Carman.
Mendota, West, Wm. R. Foster.
Oak Park, W. E. Goddard.
Paris, A. Harvey.
Princeton, Richard A. Metcalf.
Rockford, Walter A. Edwards.
South Chicago, C. I. Parker.
Streator, R. Williams.
Tuscola, Chas. S. Earle.
Wilmington, J. J. Eckman.

Also the high school of the Normal University, at Normal, O. L. Manchester, principal.

The accredited schools whose graduates are admitted to the Colleges of Engineering, of Agriculture, or of Science, are the public high schools in

SCHOOLS AND PRINCIPALS.

Aledo, J. P. Kuntz.
Barry, H. C. McCarrel.
Cambridge, Laura J. Haggart.
Centralia, Inez Brunton.
Collinsville, D. B. Fager.
DuQuoin, C. W. Harris.
Effingham, I. A. Smothers.
Greenville, D. W. Lindsey.
Hillsboro, Margaret Hubbard.
LaSalle, Geo. W. Andrew.
Lexington, Frank L. Horn.
Marengo, C. W. Hart.
Mound City, M. N. McCartney.
Olney, O. J. Bainum.
Pekin, F. W. Reubelt.
Pittsfield, I. F. Mathers.
Augusta, Annie McKee.
Belleville, H. W. Brua.
Camp Point, J. W. Creekmur.
Chicago English High and Manual Training School, D. R. Anderson.
East St. Louis, C. L. Manners.
Gibson City, J. D. Shoup.
Harvard, C. W. Groves.
Keithsburg, K. M. Whitham.
Lena, S. A. Harker.
Lyons, Ia., H. E. Robbins.
Monticello, J. H. Martin.
Newman, J. L. Hughes.
Onarga, J. R. Freebern.
Peru, Carrie V. Smith.
Polo, I. M. Bridgman.

Ridge Farm, E. Hollingsworth.
Rochelle, C. F. Philbrook.
Shelbyville, F. D. Jordan.
Sparta, John M. Nickles.
Sterling, (Wallace High School) S. B. Hursh.
Tolono, J. A. Holady.
Warsaw, Kate Johnston.
Watseka, V. L. Huey.
Wenona, Ira M. Ong.
Robinson, W. C. Neilson.
Rossville, H. W. Flanegin.
Sheldon, M. L. Weems.
Sterling, A. Bayliss.
Sullivan, B. F. McClelland.
Sycamore, A. J. Blanchard.
Warren, I. C. Baker.
Washington, F. L. Calkins.
Waverly, J. M. Humer.
Yorkville, W. J. Sutherland.

Also the Chicago Manual Training School, H. H. Belfield, Principal.

REGISTRATION.

At the beginning of each term each student must present himself for registration during the two days preceding the formation of classes; and he must be present and be registered at the first exercise of each class he is to attend.

CHOICE OF STUDIES.

Great freedom in the choice of studies is permitted. It is, however, necessarily required that the student shall be thoroughly prepared to enter, and keep pace with, the classes in the chosen studies; that he shall take these in the terms and at the time of day elsewhere designated, and that, when expecting to take a degree, he pursue the studies leading to that degree. In the College of Engineering the courses are practically prescribed. Following the description of each course of instruction given under the several colleges will be found the necessary requirements, if any, for admission to that particular course. Careful attention must be given to these requirements and to the sequence of studies thus indicated. For instance, under Descriptive Astronomy, for students of the College of Engineering, page 58, there are required "mathematics, 4;" "physics, 1;" "theoretical and applied mechanics, 1." Turning now to the general list of subjects, page 26, it is found that mathematics 4, page 31, is trigonometry; physics 1, page 32, is the major course of one year, and theoretical and applied mechanics 1, page 33, is analytical mechanics. All these subjects must have been satisfactorily passed before admission to the class in astronomy can be gained.

The work in military instruction and drill practice is required as described, of all male students during the freshman and sophomore years. Women are excused.

The described courses in rhetoric and oratory must be taken by all students at the times and to the extent given in the suggested and prescribed courses of study.

Each student must have three distinct studies, affording three daily class exercises, unless specially permitted by the Faculty to take less or more.

TERM EXAMINATIONS.

Examinations are held at the close of each term or oftener, or whenever any study has been completed. Any student failing to answer correctly 60 per cent of the questions proposed, loses all credit for that study, and is precluded from proceeding with any other studies without special permission. If he answers from 60 to 74 per cent of the questions he is *conditioned* and may have another examination on application to, and arrangement with, the instructor. 75 per cent is required to pass.

A record is kept of each student's term work and standing, and from this his final certificate of graduation is made up.

A statement of the scholarship of each student will be sent to his parent or guardian as soon as may be after the end of each term.

DEGREES.

The usual bachelors' and masters' degrees are conferred upon those who satisfactorily complete the courses of study described under the different colleges. A candidate for a bachelor's degree must pass in the subjects marked *required* in his chosen course, and must conform to the directions given in connection with that course in regard to electives. In the College of Engineering he must complete the course of study as laid down. In the Colleges of Agriculture and Literature and in the school of natural science 40 term credits, and in the College of Engineering and in the school of chemistry 41 term credits are required for graduation. This includes two credits for military science which are not required of women, who may therefore graduate with two credits less than the number stated. Men, excused for cause from the military requirements, may elect in lieu thereof two extra terms' work in any subjects taught in the University.

Credits from other colleges or universities may be accepted by the Faculty for advanced standing; but at least one year's residence at the University and the completion of one year's work are necessary to secure a bachelor's degree.

In all cases an accepted thesis is required for graduation. The subject must be announced not later than the first Monday of the winter term, and the completed thesis must be handed to the dean of the proper College by April 30th. The work should be done under the direction of the professor in whose department the subject naturally belongs, and should be in the line of the course of study for which a degree is expected. The thesis should be based upon original research, and must contain at least 2,000 words, or an equivalent in tables, drawings, and illustrations. It must be presented upon regulation paper and will be deposited in the library of the University.

1. The degree of Bachelor of Arts will be given to those who complete a classical course in the College of Literature.

2. The degree of Bachelor of Letters will be given to those who complete one of the other courses in the College of Literature. The name of the course will be inserted after the degree.

3. The degree of Bachelor of Science will be given to those who complete a course of study in the College of Engineering, of Agriculture, or of Science. The name of the course will be inserted after the degree.

4. The master's degrees, M.A., M.L., and M.S., and the equivalent degrees of Civil Engineer and Mechanical Engineer, etc., will be given, after 1894, to graduates of this or other similar institutions who have pursued at this University a year of prescribed graduate studies and have passed examinations thereon, or who have pursued as non-residents three years of such study and have passed the required examinations. Studies for a master's degree must be in the general line of the bachelor's degree already received, and of the degree sought.

In all cases an accepted thesis is required and this should be presented at least one month before the close of the collegiate year. It must be based upon original research and must show scholarly acquirements of high order.

Graduates of this University who took a first degree before 1892 may obtain a second degree as heretofore, until after 1894.

BOARD.

The University does not furnish board, but there is an abundance of suitable private places in Urbana and Champaign within walking distance of the University; and easily accessible by electric railway, where students can obtain table board and rooms. Boarding clubs are formed, at which the cost of meals is about two and a half dollars per week. Some students prepare their own meals, thus considerably reducing expenses.

The Business Agent and the Young Men's and Young Women's Christian Associations of the University will aid new students in procuring rooms and boarding places.

EXPENSES.

THE TUITION IS FREE in all the University classes.

THE MATRICULATION FEE entitles the student to membership in the University until he completes his studies $10 00

THE DIPLOMA FEE, payable before graduation 5 00

THE TERM FEE for incidental expenses is for each student..... 7 50

Each student working in laboratories, or in the draughting or engineering classes, is required to make a deposit varying from 50 cents to $10, to pay for chemicals and apparatus used, and for any breakages or damages.

ALL BILLS due the University *must be paid within ten days after the student enters classes.*

ESTIMATES OF EXPENSES.

The following are estimated maximum and minimum annual expenses exclusive of books and clothing, railroad fare, and small miscellaneous needs.

Term fees.....	$22 50	$22 50
Room rent for each student.....	18 00	50 00
Table board in boarding houses and clubs.....	90 00	126 00
Fuel and light.....	10 00	15 00
Washing at 60 cents per cents per dozen.....	9 00	18 00
Total.....	$149 50	$231 50
Board and room in private houses, per week.....	4 00	6 00

FEES IN THE PRELIMINARY YEAR, OR THE JUNIOR COURSE IN AGRICULTURE.

Tuition, per term.....	$ 5 00
Incidental fee, per term.....	7 50

CAUTION TO PARENTS—STUDENTS' FUNDS.

The Business Agent will receive on deposit any funds parents may intrust to him to meet the expenses of their sons and daughters. *No greater error can be committed than to send young people from home with large amounts of spending money*, without the authoritative care of some

prudent friend. Half the dissipation in colleges springs from excessive allowances of money. Students have little real need for money beyond that required for fees, board bills, and books. The attention of parents and guardians is earnestly requested to this matter, and especially in the case of those students who are under age.

PREPARATORY CLASSES.

To meet an urgent demand, the Trustees have temporarily provided for teaching the preparatory studies lying between the work of the elementary schools and the University. Candidates for these classes must not be less than fifteen years old. They must pass a satisfactory examination in arithmetic, geography, English grammar, and history of the United States.

Students in the preparatory studies are not matriculated as members of the University. They pay no entrance fee, but are charged a tuition fee of five dollars a term, and an incidental fee of seven and a half dollars a term. They have all the privileges of the library, and of public lectures.

The studies taught in the preliminary year are as follows:

For Colleges of Agriculture, Engineering, and Science.

First term.—Algebra—(Wells's). Fundamental rules, factoring, common divisors and multiples, powers and roots, calculus of radicals, simple equations, proportion and progression. Physiology—(Cutter's). Natural Philosophy—(Gage's).

Second Term.—Algebra—Quadratic equations, etc. Geometry—(Wells's) Plane geometry, lines, circumferences, angles, polygons, as far as equality. English—Elements of composition. (Clark's). Orthoepy and word analysis. (Introduction of Webster's Academic Dictionary.)

Third Term.—Geometry completed, including solid and spherical geometry. English, as in the second term, with addition of Goldsmith's Deserted Village, Shakspere's Merchant of Venice, Scott's Lady of the Lake, Emerson's The American Scholar, Longfellow's Evangeline, Macaulay's Second Essay on the Earl of Chatham, Scott's Marmion, Webster's first Bunker Hill oration, and Irving's Sketch Book, read with care. Botany—Gray's Lessons and Manual.

FOR COURSES IN THE COLLEGE OF LITERATURE, EXCEPT THE CLASSICAL COURSE.

First Term.—Algebra as above. Physiology. Natural Philosophy. Latin—Cicero's Orations. Prose composition.

Second Term.—Algebra and Geometry, as above. Latin—Aeneid. Prose composition.

Third Term.—Geometry, as above. Botany. Latin—Aeneid. Prose composition.

FOR CLASSICAL COURSE.

First Term.—Algebra, as above. Latin—Cicero's Orations. Prose composition. Greek—Grammar (Goodwin) and Reader (Moss). Prose composition.

Second Term.—Algebra and Geometry, as above given. Latin—Aeneid. Prose composition. Greek—Continuation of first term. Prose composition.

Third Term.—Geometry completed. Latin—Aeneid. Prose composition. Greek—Anabasis (Kelsey). Prose composition. (Woodruff).

LIST OF STUDENTS.

GRADUATE SCHOOL.

Piatt, Herman S, B.A., (Fellowship)	*Champaign*,	Classical.
Woodworth, Howard Oakley, B.S.,	*Champaign*,	Natural Science.
Barber, Alice May, B.S. (Fellowship)	*La Fox*,	Natural Science.
Parr, Mrs. Lucie Hall,	*Champaign*,	Music.

RESIDENT GRADUATES.

Hart, Ralph Warner, B.S.,	*Harvey*,	Architecture.
McHugh, George B, B.S.,	*Urbana*,	Chemistry.
Myers, George William, M.L.,	*Urbana*,	Mechanical Engineering.
Pence, William David,	*Champaign*,	Civil Engineering.
Seibert, Emma Effie, B.S.,	*Champaign*,	Natural Science.

SENIOR CLASS.

Andrews, Hubert Franklin,	*Piasa*,	Natural Science.
Arbeiter, George John,	*Plainfield*,	Eng. and Mod. Lang.
Bacon, Harlow,	*Huntsville*,	Civil Engineering.
Barrett, Edward Ernest,	*Port Byron*,	Civil Engineering.
Bartlett, Henry Emmett,	*Mt. Sterling*,	Civil Engineering.
Behrensmeyer, George Philip,	*Quincy*,	Architecture.
Blakesley, George Webster,	*Rock Island*,	Electrical Engineering.
Brown, Frank Manear,	*Champaign*,	Architecture.
Carpenter, Harvey Irving,	*Urbana*,	English and Mod. Lang.
Carr, Robert Franklin,	*Argenta*,	Chemistry.
Carter, Charles Willard,	*Aledo*,	English and Mod. Lang.
Chambers, William Rock,	*Sadorus*,	English and Mod. Lang.
Chester, Oscar Paul,	*Champaign*,	Natural Science.
Coffeen, Fred Goldsmith,	*Champaign*,	Chemistry.
Cook, James W,	*Rock Island*,	Mech. Engineering.
Cornell, William Henry,	*Grant Park*,	Mech. Engineering.
Craig, Edward Chilton,	*Mattoon*,	Latin.
Danley, Willis Wilson,	*Hennepin*,	Civil Engineering.
Earl, Mark Alden,	*Centralia*,	Civil Engineering.

Fraser, Wilber John,	*Plainfield*,	Agriculture.
Gibbs, William David,	*Winchester*,	Agriculture.
Graham, Louis Thomas,	*Pittsfield*,	English and Mod. Lang.
Graham, William Johnson,	*Aledo*,	English and Mod. Lang.
Gulick, Frank M,	*Champaign*,	Eng. and Mod. Lang.
Higgins, Albert Grant,	*Elmwood*,	Architecture.
Hucke, Philip Matthias,	*Mascoutah*,	Natural Science.
Hunt, Edward Everett,	*Urbana*,	Chemistry.
Kinkead, James Albert,	*Earlville*,	Chemistry.
Klingel, Louis,	*Mascoutah*,	Eng. and Mod. Lang.
Levy, Alexander,	*Brookfield, Mo.*,	Architecture.
Loomis, Arthur Bates,	*Fulton*,	Civil Engineering.
McCartney, William Priestly,	*Metropolis*,	Chemistry.
McCloy, Robert Emmett,	*Welton*,	English and Mod. Lang.
McClure, Clyde Benjamin,	*Gibson City*,	Civil Engineering.
McGee, Walter Scott,	*Decrs*,	Natural Science.
McMains, Louis,	*Crawfordsville, Ind.*,	Nat. Science.
Metcalf, James David,	*Girard*,	Chemistry.
Millar, Clendon VanMeter,	*Mattoon*,	Chemistry.
Mosier, Jeremiah George,	*Urbana*,	Natural Science.
Peterson, Adolph Bertinus,	*Chicago*,	Architecture.
Phillips, James David,	*Englewood*,	Architecture.
Powers, Will Ambrose,	*Belvidere*,	Chemistry.
Rea, Alfred Willemin,	*Urbana*,	Architecture.
Rowe, William Briggs,	*Champaign*,	Classical.
Russell, Charles Wesley,	*Virginia*,	Classical.
Scott, Donald Gamaliel,	*Champaign*,	Architecture.
Seaman, George Washington,	*Urbana*,	Mechanical Engineering.
Sharpe, Richard W.,	*Tiskilwa*,	Natural Science.
Shiga, Shigetsura,	*Tokio, Japan*,	Architecture.
Skielvig, Severin Canute,	*Chicago*,	Architecture.
Spalding, Fred Milton,	*Gibson City*,	Civil Engineering.
Steinwedell, William Ernest,	*Quincy*,	Electrical Engineering.
Stewart, John Truesdale,	*Paxton*,	Civil Engineering.
Swenson, Bernard Victor,	*Chicago*,	Elect. and Mech. Eng'ring.
Sy, Albert Philip,	*Altamont*,	Chemistry.
Thompson, Almon Daniel,	*Gilman*,	Civil Engineering.
Townsend, William,	*Champaign*,	Civil Engineering.
Vial, Robert Clarke,	*Western Springs*,	Civil Engineering.
Woodruff, Thomas Tyson,	*Quincy*,	Electrical Engineering.
Young, Orres Ephraim,	*Stonington*,	Eng. and Mod. Lang.

Arnold, Mary Edna,	*Souders*,	Classical.
Ayers, Grace,	*Urbana*,	Eng. and Mod. Lang.
Johnson, Harriette Augusta,	*Rock Island*,	Eng. and Mod. Lang.
Lamkin, Nina Belle,	*Champaign*,	Eng. and Mod. Lang.
Mann, Mary Estelle,	*Geneva*,	Eng. and Mod. Lang.
Mathews, Loueva May,	*Urbana*,	Eng. and Mod. Lang.
Peterson, Sophia Mary,	*Champaign*,	Eng. and Mod. Lang.

JUNIOR CLASS.

Aranda, Ezequiel,	*Allende, Mex.*,	Mech. Engineering.
*Arms, Franklin David,	*Chicago*,	Architecture.
Armstrong, James William,	*Toulon*,	Electrical Engineering.
Atwood, Levi Patton,	*Rockford*,	Civil Engineering.
Babcock, Clyde Leslie,	*Harvard, Neb.*,	Civil Engineering.
Barker, Louis William,	*Sparta*,	Electrical Engineering.
*Baughman, Charles Otis,	*Camp Point*,	Civil Engineering.
Bauman, Otto,	*Quincy*,	Electrical Engineering.
Beasley, Harrison Easton,	*Peoria*,	Civil Engineering.
Bissell, Frank,	*Farmer City*,	Latin.
Braucher, Herbert Hill,	*Lincoln*,	Agriculture.
Brownell, Charles Dean,	*Champaign*,	Chemistry.
Browning, Howard Allen,	*Elgin*,	Architecture.
Bush, Arthur Willis,	*Joliet*,	Architecture.
Butterfield, Clarence James,	*Chicago*,	Architecture.
Chipman, Paul,	*Mt. Carmel*,	Civil Engineering.
Coffman, Birch David,	*Champaign*,	Natural Science.
Cornell, Frank Howe,	*Yorkville*,	Natural Science.
Crawford, Thomas,	*Sterling*,	Electrical Engineering.
Dickinson, Richard Joy,	*Eureka*,	Civil Engineering.
Eakle, Silas Jackson,	*Forreston*,	Natural Science.
Earl, Edward Curtis,	*Centralia*,	Architecture.
Engberg, Martin Jonas,	*Chicago*,	Chemistry.
Foote, Ferdinand John,	*Champaign*,	Electrical Engineering.
Foster, Alfred Bradford,	*Urbana*,	Civil Engineering.
Frederickson, George,	*Champaign*,	Natural Science.
Gaffin, William Ward,	*Leaf River*,	Civil Engineering.
Gaut, Robert Eugene,	*Mt. Sterling*,	Civil Engineering.
Goldschmidt, Otto Emil,	*Davenport, Ia.*,	Elec. Engineering.
Gumbiner, Charles,	*Peoria*,	Civil Engineering.
Heideman, George Herman,	*Elmhurst*,	Electrical Engineering.

Holbrook, Fred Samuel,	*Englewood,*	Chemistry.
Holston, Benjamin Baldwin,	*Nashville,*	Natural Science.
Hottes, Charles Frederick,	*Mascoutah,*	Natural Science.
Jansen, Dietrich Herman,	*Pekin,*	Civil Engineering.
Johannsen, Albert,	*State Center, Ia.,*	Architecture.
Johannsen, Oskar August,	*State Center, Ia.,*	Architecture.
Jasper, Thomas,	*Quincy,*	Electrical Engineering.
Kennedy, John William,	*Collinsville,*	Architecture.
Kerns, Shirley Kendrick,	*Champaign,*	Chemistry.
*Kimball, Conrad Bryant,	*Champaign,*	Architecture.
Kimball, William Haven,	*Chicago,*	Mechanical Engineering.
Lake, Edward John,	*Viroqua, Wis.,*	Architecture.
Lockwood, Frank Miner,	*Champaign,*	Architecture.
Lowry, James Percival,	*Gibson City,*	Architecture.
Lowry, John Albert,	*Gibson City,*	Civil Engineering.
McConnell, Ernst,	*Table Rock, Col.,*	Architecture.
McNutt, John, Jr.,	*Humbolt,*	Latin.
Miller, Grant Clark,	*Rockford,*	Architecture.
Mogenson, Peter,	*Copenhagen, Denmark,*	Civ. Eng.
Morris, Edgar William,	*Onarga,*	English and Mod. Lang.
Morrissey, Daniel C,	*Champaign,*	Eng. and Mod. Lang.
Needham, James,	*Collinsville,*	Mining Engineering.
Parry, Joseph Lawrence,	*Tolono,*	English and Mod. Lang.
*Phelps, Albert Charles,	*Lockport,*	Architecture.
Reed, James Horatio,	*Evanston,*	Electrical Engineering.
*Riley, Walter Busey,	*Champaign,*	Eng. and Mod. Lang.
Rutledge, John Joseph,	*Alton,*	Mining Engineering.
Slater, William Frederick,	*Urbana,*	Electrical Engineering.
Stocker, Edwin Warren,	*Rock Island,*	Architecture.
Strauss, William,	*Pittsfield,*	Chemistry.
Strehlow, Oscar Emil,	*Champaign,*	Civil Engineering.
*Strout, Frank Asbury,	*Elwood,*	Mechanical Engineering.
Tackett, William C,	*Champaign,*	Eng. and Mod. Lang.
Templeton, Benjamin Franklin,	*Palestine,*	Classical.
Tower, Willis Eugene,	*Chana,*	Chemistry.
Trego, Charles Henry,	*Hoopeston,*	Electrical Engineering.
Walton, Thomas Percival,	*Paxton,*	Civil Engineering.
Weaver, Leslie Alvord,	*Danville,*	Latin.
Weedman, Fred John,	*Farmer City,*	Eng. and Mod. Lang.
Wilder, Charles Thornton,	*Champaign,*	Natural Science.
Yeakel, William Kriebel,	*Polo,*	Natural Science.

Boggs, Pearl,	*Urbana*,	Classical.
McCaskrin, Louise Elizabeth,	*Rantoul*,	Natural Science.
Naughton, Katheryn Louise,	*Champaign*,	Eng. and Mod. Lang.
Nichols, Maude E,	*Urbana*,	Natural Science.
*Scott, Daisy Coffin,	*Champaign*,	Latin.
Shawhan, Gertrude,	*Urbana*,	English and Mod. Lang.
Wingard, Anna Laura,	*Champaign*,	Eng. and Mod. Lang.
Woolsey, Ola C,	*Polo*,	Lat. and Eng. and Mod. Lang.

SOPHOMORE CLASS.

Arms, Herbert Clarke,	*Chicago*,	Architecture.
Armstrong, John Adams,	*Kewanee*,	Mechanical Engineering.
Ashley, Richard Jason,	*Tonica*,	Mechanical Engineering.
Atkinson, John Thomas,	*Wilmington*,	Mech. Engineering.
Ayers, Clarence Otto,	*Nashville*,	Natural Science.
Barr, Richard James,	*Wilton Center*,	Eng. and Mod. Lang.
Barry, Charles,	*Henry*,	Mechanical Engineering.
Baum, Harry William,	*Indianola*,	Civil Engineering.
Beebe, Fred Albert,	*Wisner, Neb.*,	Mech. Engineering.
Boon, William Guthrie,	*Armstrong*,	Civil Engineering.
Bower, Lorin Alphonso,	*Oreana*,	Civil Engineering.
*Bower, Robert Allan,	*Tolono*,	Eng. and Mod. Lang.
Burdick, Charles Baker,	*Sterling*,	Civil Engineering.
Burrill, William Thomas,	*Shelby, Neb.*,	Architecture.
Busey, Frank Lyman,	*Urbana*,	Mechanical Engineering.
Capps, Earl Vanhise,	*Mt. Pulaski*,	Electrical Engineering.
Carberry, Ray Shepard,	*Mansfield*,	Civil Engineering.
Carmack, Clyde Roberts,	*Camargo*,	Mechanical Engineering.
Carnahan, David Hobart,	*Champaign*,	Latin.
Carpenter, Frank Albert,	*Rockford*,	Architecture.
Chester, Wilfred Dudley,	*Champaign*,	Mining Engineering.
Clark, Amos Cable,	*Urbana*,	Architecture.
*Clement, Clarence Adelbert,	*Tiskilwa*,	Civil Engineering.
*Clinton, John Dewitt,	*Polo*,	Chemistry.
Decius, Lyle,	*Toledo*,	Eng. and Mod. Lang.
*Doxey, Samuel,	*Ogden City, Utah*,	Architecture.
Drake, Louis Sanford,	*Chicago*,	Eng. and Mod. Languages.
Duffy, Sherman,	*Ottawa*,	Latin.

*Behind one study.

Elder, Charles Abbott,	*Topeka, Kan.*,	Architecture.
Emmons, Henry Jeffers,	*Atkinson*,	Civil Engineering.
*Fay, Frank Earle,	*Marengo*,	Civil Engineering.
Fellheimer, Alfred,	*Chicago*,	Architectural Engineering.
Fletcher, Marcus Samuel,	*Ridge Farm*,	Natural Science.
Fulton, George Thomas,	*Waterman*,	Civil Engineering.
Funston, Jesse Grant,	*Champaign*,	Mechanical Engineering
Frye, Theodore Christian,	*Congerville*,	Natural Science.
Green, James Albert,	*Ivesdale*,	Mechanical Engineering.
Hall, Emery Stanford,	*Urbana*,	Architecture.
Harms, Armin,	*Rock Island*,	Chemistry.
Harvey, Guy Charles,	*Tolono*,	Chemistry.
Herdman, Herbert Orville,	*Taylorville*,	Natural Science.
Hiles, Elmer Kirkpatrick,	*Chicago*,	Mechanical Engineering.
*Hobbs, Reuben Merrill,	*Yorkville*,	Chemistry.
Holtzman, Stephen Ford,	*Pontiac*,	Architectural Engineering.
Huff, George A, Jr.,	*Englewood*,	Chemistry.
Hunt, Ernest Alexander,	*Urbana*,	Electrical Engineering.
Johnson, Herbert Lewis,	*Elgin*,	Architecture.
Johnson, Lewis Williams,	*Champaign*,	Chemistry.
Johnston, Elmer Alward,	*Champaign*,	Mechanical Engineering.
Junkersfeld, Peter,	*Sadorus*,	Electrical Engineering.
*Keeler, Frederick Blair,	*Earlville*,	Architecture.
Kerchner, Fred William,	*Belleville*,	Chemistry.
Ketchum, Milo Smith,	*Elmwood*,	Civil Engineering.
Lemen, William Clarence,	*Morganfield, Ky.*,	Civil Engineering.
Lewellyn, David Rossiter,	*Sterling*,	Mechanical Engineering.
Long, Albert Milton,	*Virden*,	Architecture.
Lyons, Timothy John,	*Sadorus*,	Electrical Engineering.
McCaskrin, George Washington,	*Rantoul*,	Chemistry.
McCaskrin, Harry Madison,	*Rantoul*,	Natural Science.
*McLane, John Wallace,	*Allerton, Ia.*,	Chemistry.
McRae, John Alexander,	*Kewanee*,	Mechanical Engineering.
Mann, Edward Loring,	*Gilman*,	Eng. and Mod. Lang.
Marsh, Horatio Richmond,	*Joliet*,	Natural Science.
Mather, Fred Elbert,	*Naperville*,	Arch. Engineering.
Maxon, Robbins Yale,	*Danville*,	Civil Engineering.
Maxwell, Charles Jacob,	*Champaign*,	Chemistry.
Morrison, William Robert,	*Joliet*,	Architecture.
Munn, Alexander Majors,	*Swift, Neb.*,	Civil Engineering.

*Behind one study.

Neal, John Dodge,	*Rantoul*,	Chemistry.
Orr, Edward Ellsworth,	*Quincy*,	Architecture.
Parker, Hervey Edwin,	*Champaign*,	Architecture.
*Perkins, Allie Christian,	*Tolono*,	Electrical Engineering.
Quade, John Conrad,	*Moline*,	Civil Engineering.
Reely, Thomas,	*Spring Green, Wis.*,	Architecture.
Reeves, Harley Edson,	*Champaign*,	Civil Engineering.
Roberts, Francis Eugene,	*Chicago*,	Architectural Engineering.
Roby, Luther Edward,	*Decatur*,	Mechanical Engineering.
Root, George Hinchliff,	*Chicago*,	Architectural Engineering.
Royer, Joseph William,	*Urbana*,	Architecture.
Roysdon, William Ira,	*Champaign*,	Eng. and Mod. Lang.
Sayers, Albert Jefferson,	*Champaign*,	Mech. Engineering.
Scott, William John,	*Champaign*,	Civil Engineering.
Scurlock, Henry Harrison,	*Jackson, Ohio*,	Natural Science.
Seastone, Charles Victor,	*New Boston*,	Civil Engineering.
Shepardson, John Eaton,	*Aurora*,	Civil Engineering.
Smith, Louie Henrie,	*Crystal Lake*,	Chemistry.
Snider, Harry Holderman,	*Rantoul*,	Mechanical Engineering.
Sperling, Godfrey,	*Dewey*,	Civil Engineering.
Spurgin, William Grant,	*Urbana*,	Classical.
Stark, Robert Watt,	*Augusta*,	Chemistry.
Stoltey, Benjamin Franklin,	*Champaign*,	Architecture.
Stowell, Hanson Abbott,	*Anona, Fla.*,	Eng. and Mod. Lang.
Tarble, Myron Joy,	*Aurora*,	Civil Engineering.
Teeple, Wallace Douglas,	*Marengo*,	Architecture.
Thomas, Homer,	*Kickapoo*,	Arch. Engineering.
Vance, Walter Noble,	*Bement*,	Electrical Engineering.
Webster, Charles Carlton,	*Polo*,	Mechanical Engineering.
White, Solon Marks,	*Sandwich*,	Natural Science.
Williams, Parker Merrill,	*Moline*,	Electrical Engineering.
*Williams, Scott,	*Bloomington*,	Mech. Engineering.

Beidler, Gertrude Lou,	*Champaign*,	Eng. and. Mod. Lang.
*Brown, Katherine,	*Oreana*,	Natural Science.
Call, Hortense,	*Urbana*,	Natural Science.
Foote, Dora Francelia Burton,	*Champaign*,	Natural Science.
Forbes, Bertha,	*Urbana*,	Natural Science.
Green, Marianna,	*Champaign*,	Eng. and Mod. Lang.
Ludden, Eva Louise,	*East Lynn*,	Eng. and Mod. Lang.

*Behind one study.

McCullough, Jessie Olive,	*Urbana*,	Eng. and Mod. Lang.
McFadden, Alice Alberta,	*Champaign*,	Natural Science.
Moore, Grace Lillian,	*Tolono*,	Natural Science.
*Pillsbury, Bertha Marion,	*Urbana*,	Classical.
Stewart, Mabel,	*Champaign*,	Natural Science.
Thompson, Marion,	*Bement*,	Latin.

FRESHMAN CLASS.

Adams, Edward Langford,	*Austin*,	Mechanical Engineering.
Arnold, John William,	*Lockport*,	Civil Engineering.
Atherton, George Henry,	*Streator*,	Mining Engineering.
Bailey, Leonard Lionel,	*Chicago*,	Architectural Engineering.
Baird, Walter Hayes,	*Normal*,	Electrical Engineering.
Banschbach, Edward Aaron,	*Princeton*,	Electrical Engineering.
Bassett, John Benjamin,	*Kewanee*,	Architecture.
Beasley, Abel Harwood,	*Champaign*,	Chemistry.
Begole, Joshua Franklin,	*O'Fallon*,	Mechanical Engineering.
Bell, James Arthur,	*Channahon*,	Electrical Engineering.
†Bennett, Charles Gerrish,	*Mattoon*,	Classical.
Benson, Oliver Newkirk,	*Champaign*,	Architecture.
Bigham, John Ross,	*Chatsworth*,	Mechanical Engineering.
Boggs, Fortune Stanley,	*Urbana*,	Mechanical Engineering.
Bower, Samuel Meharry,	*Tolono*,	Natural Science.
Boyd, George,	*Roseville*,	Civil Engineering.
Brenke, William Charles,	*Chicago*,	Chemistry.
Brode, Arthur Willis,	*Buda*,	Mechanical Engineering.
Brower, Ralph Plumb,	*Ottawa*,	Civil Engineering.
Brown, Fred Gage,	*Urbana*,	Architecture.
Bryant, Lester Peck,	*Princeton*,	Civil Engineering.
Buford, Clarke Howe,	*Rock Island*,	Architecture.
Burdsal, Charles Southerd,	*Evanston*,	Mining Engineering.
Burke, William Harry,	*Urbana*,	Electrical Engineering.
Burtt, Wilson Bryant,	*Hinsdale*,	Civil Engineering.
Bussey, Clyde George,	*Lanark*,	Mechanical Engineering.
Campbell, Walter Gilbert,	*Urbana*,	Electrical Engineering.
Carr, Walter Scott,	*Argenta*,	Natural Science.
Carswell, Arthur Scott,	*New City*,	Electrical Engineering.
Chapman, Frank,	*Galesburg*,	Electrical Engineering.
Chapman, Paul Reed,	*Chicago*,	Electrical Engineering.

*Behind one study.
† Deceased.

Chatten, Melville Clark,	*Quincy*,	Architecture.
Chester, Henry Ezra,	*Champaign*,	Chemistry.
Cook, Harry Vance,	*Rock Island*,	Electrical Engineering.
Cook, Walter Scott Downing,	*St. Louis, Mo.*,	Architecture.
Cooper, Paul Henry,	*Mendota*,	Electrical Engineering.
Colver, Horace Nathaniel,	*Marengo*,	Electrical Engineering.
Cowles, Roy Merrick,	*Englewood*,	Mechanical Engineering.
Cutter, Scott Clay,	*Oswego*,	Chemistry.
Crum, Herbert Andrews,	*Farmer City*,	Eng. and Mod. Lang.
Donnan, Alexander,	*Independence, Ia.*,	Architecture.
Downing, Ernest Albert,	*Belvidere*,	Electrical Engineering.
Durstine, Warren Edward,	*Rock Falls*,	Electrical Engineering.
Drury, George Edward,	*Wilmette*,	Architecture.
Ellis, William Sterling,	*Chicago*,	Architecture.
Elwood, Roy Spencer,	*Nashville*,	Electrical Engineering.
Estee, Henry Clarence,	*Gibson City*,	Civil Engineering.
Evans, Robert Herman,	*Bloomington*,	Architecture.
Everett, Frank Milton,	*Quincy*,	Electrical Engineering.
Ferguson, Eugene Ray,	*Morris*,	Mechanical Engineering.
Fitzwilliam, Frank Joel,	*Bloomington*,	Architecture.
Flynn, Thomas Francis,	*Tolono*,	Electrical Engineering.
Fouts, Lewis Hayden,	*Bradford*,	Eng. and Mod. Lang.
Gableman, Julius,	*Okawville*,	Civil Engineering.
Gamble, Samuel Welsey,	*Chicago*,	Architecture.
Gearhart, Orval Lee,	*Farmer City*,	Architecture.
Gray, Frederick,	*Bloomington*,	Electrical Engineering.
Green, Herbert John,	*Kewanee*,	Architecture.
Gulick, Seeley,	*Champaign*,	Natural Science.
Hamilton, Frank Henry,	*Springfield*,	Civil Engineering.
Hamilton, Vernor Edward,	*Gardner*,	Architecture.
Hanker, William Julius,	*Toledo*,	Architecture.
Haskell, Howard Hall,	*Mendota*,	Electrical Engineering.
Havard, Oliver David,	*Homer*,	Electrical Engineering.
Hawker, Frank Allen,	*Urbana*,	Electrical Engineering.
Heaton, Thomas Reid,	*Delavan*,	Civil Engineering.
Heisel, Henry Marshall,	*Chicago*,	Mechanical Engineering.
Higgins, Charles Campbell,	*Aurora*,	Mechanical Engineering.
Hindman, John,	*Urbana*,	Eng. and Mod. Lang.
Hoag, Parker Hale,	*Champaign*,	Classical.
Honens, Fred William,	*Milan*,	Civil Engineering.
Hottes, Henry Gustav,	*Mascoutah*,	Architecture.

Hubbard, George David,	*Urbana*,	Agriculture.
Hughes, Frank Alexis,	*Okawville*,	Civil Engineering.
Jackson, Z Edward,	*Atchison, Kan.*,	Electrical Eng.
Jobst, George J,	*Peoria*,	Civil Engineering.
Jones, Fred R,	*Neponset*,	Mechanical Engineering.
Karpen, Julius,	*Chicago*,	Latin.
Keck, Hiram Isaac,	*Montgomery*,	Electrical Engineering.
Keeler, Harry,	*Chicago*,	Natural Science.
Kent, Louis Maxwell,	*Danville*,	Natural Science.
Ketchum, Richard Bird,	*La Prairie*,	Civil Engineering.
Killam, Francis Grimes,	*Comer*,	Mechanical Engineering.
Klossowski, Theodore Julius,	*Dixon*,	Civil Engineering.
Kuhn, Anthony Edward,	*Tiskilwa*,	Natural Science.
Larimore, Charles Wesley,	*Jacksonville*,	Electrical Engineering.
Leigh, Charles Wilber,	*La Prarie Center*,	Electrical Eng.
Lenning, Ernest Hjalmar,	*Chicago*,	Mechanical Engineering.
Lewis, Charles Milton,	*Blue Mound*,	Architecture.
Lienisch, Walter Herman,	*O'Fallon*,	Mechanical Engineering.
Liese, George Charles,	*Nashville*,	Architecture.
Linn, Homer Roberts,	*Byron*,	Mechanical Engineering.
Ludwick, George,	*St. Joseph*,	Civil Engineering.
McBride, Willis Brammer,	*Taylorville*,	Civil Engineering.
McElfresh, Fred Morgan,	*Jacksonville*,	Natural Science.
MacGregor, Leonard Allen,	*Earlville*,	Architecture.
McKee, Eli Earl,	*Rising*,	Architectural Engineering.
McNichols, Ira Arthur,	*Tolono*,	Chemistry.
Manard, Robert Payton,	*Rockford*,	Architecture.
Marble, Harry Curtis,	*Champaign*,	Electrical Engineering.
Mead, Ellis Herman,	*Belvidere*,	Electrical Engineering.
Mell, Joseph Lenard,	*San Jose*,	Civil Engineering.
Millar, Harry Knowles,	*Mattoon*,	Civil Engineering.
Milne, Edward Lawrence,	*Lockport*,	Civil Engineering.
Morse, Jedidiah D,	*Champaign*,	Chemistry.
Mueller, Oscar,	*Decatur*,	Mechanical Engineering.
Myers, James William,	*Chrisman*,	Eng. and Mod. Lang.
Naughton, Charles Colby,	*Champaign*,	Mech. Engineering.
Nelson, Francis Lovell,	*Paris*,	Eng. and Mod. Lang.
Noble, Charles William,	*Chicago*,	Architectural Engineering.
Noble, William,	*Champaign*,	Classical.
Ogiwara, Chijokichi,	*Tokio, Japan*,	Mech. Engineering.
Patterson, William Madison,	*Farmer City*,	Eng. and Mod. Lang.

Peterson, Martin,	*Englewood*,	Architecture.
Pfeffer, John Edward,	*Boudville*,	Mechanical Engineering.
Phelps, George Budd,	*Carlinville*,	Architecture.
Pierce, William Thomas,	*Mt. Carroll*,	Civil Engineering.
Porter, Robert Knight,	*Champaign*,	Classical.
Randall, Parke Benjamin,	*Aurora*,	Civil Engineering.
Ray, George Joseph,	*El Paso*,	Civil Engineering.
Reardon, Edward Emmett,	*Boynton*,	Eng. and Mod. Lang.
Reasoner, Mathew Aaron,	*Philo*,	Natural Science.
Rice, Henry Burgett,	*Lewistown*,	Agriculture.
Rickard, Earnest Thomas,	*Springfield*,	Electrical Engineering.
Risor, Cady Alvern,	*Eureka*,	Electrical Engineering.
Rogers, John Francis,	*Chicago*,	Chemistry.
Roberts, John Jacobs,	*Sadorus*,	Electrical Engineering.
Row, George Edward,	*Centralia*,	Mechanical Engineering.
Rowe, Herbert Brunskill,	*Redmon*,	Chemistry.
Sachse, Edward George,	*Morris*,	Electrical Engineering.
Salamson, Max,	*Chicago*,	Mechanical Engineering.
Saunders, Harry J,	*Chicago*,	Natural Science.
Seeber, Peter,	*Tomlinson*,	Natural Science.
Sexton, Leon Jay,	*Viola*,	Natural Science.
Sherman, Cecil Harvey,	*Elgin*,	Architectural Engineering.
Shea, John Clark,	*Danville*,	Mechanical Engineering.
Shippee, Henry Claud,	*Steward*,	Chemistry.
Simons, Alexander Martin,	*Quincy*,	Electrical Engineering.
Southward, Harry Austin,	*New Boston*,	Electrical Engineering.
Staley, William Theron,	*Urbana*,	Eng. and Mod. Lang.
States, William Daniel,	*Elwood*,	Mechanical Engineering.
Steele, William LaBarthe,	*Springfield*,	Architecture.
Stone, Percy Allyn,	*Bradfordton*,	Electrical Engineering.
Stroker, George Dick,	*Palatine*,	Civil Engineering.
Swannell, Dan Gardner,	*Champaign*,	Chemistry.
Sweney, Don,	*Mason City*,	Mechanical Engineering.
Sylvester, Edmund Lewis,	*Aurora*,	Civil Engineering.
Tait, Daniel Webster,	*Macon*,	Agriculture.
Taylor, Wilson,	*Urbana*,	Eng. and Mod. Lang.
Thompson, Fred Lawrence,	*Isabel*,	Civil Engineering.
Tilton, Harry William,	*Mt. Carmel*,	Electrical Engineering.
Ulrich, William Gus,	*Chicago*,	Civil Engineering.
Vail, Walter Cheney,	*Kewanee*,	Architecture.
VanOrstrand, Charles Edwin,	*Pekin*,	Civil Engineering.

VanMeter, Seymour,	*Cantrall*,	Architecture.
Vickery, Charles Roy,	*Dwight*,	Natural Science.
Wakefield, George Mighell,	*Waterman*,	Mining Engineering.
Walker, George Washington,	*Walker*,	Agriculture.
Warnecke, Carl Marie,	*Denver, Colo.*,	Architecture.
Weinshenk, Theodore,	*Champaign*,	Mechanical Engineering.
West, George Amasa,	*Leaf River*,	Mechanical Engineering.
Whitham, Myron Elwise,	*Warren*,	Mechanical Engineering.
Whittemore, Floyd,	*Sycamore*,	Mechanical Engineering.
Wills, George Arthur,	*Chicago*,	Electrical Engineering.
Woody, Frederick Way,	*Champaign*,	Municipal Engineering.
Young, Clyde Cyrus,	*Stonington*,	Natural Science.

Barnes, Jessie,	*Champaign*,	Natural Science.
Bennett, Georgia E,	*Milford Centre, O.*,	Natural Science.
Besore, Nellie,	*Urbana*,	Eng. and Mod. Lang.
Burt, Myra Ernestine,	*Urbana*,	Architecture.
Cairns, Cora Mae,	*Polo*,	Eng. and Mod. Lang.
Clarke, Florence,	*Quincy*,	Natural Science.
Crum, Ellen Petefish.	*Farmer City*,	Classical.
Fleming, Edith Anna Belle,	*Champaign*,	Eng. and Mod. Lang.
Gibbs, Carrie,	*Mattoon*,	Eng. and Mod. Lang.
Halliday, Charlotte Josephine,	*Cairo*,	Eng. and Mod. Lang.
Harris, Effie Estelle,	*Champaign*,	Eng. and Mod. Lang.
Hopper, Georgia Etherton,	*Lockport*,	Eng. and Mod. Lang.
Kiler, Aureka Belle,	*Urbana*,	Eng. and Mod. Lang.
Leal, Sophie Nott,	*Urbana*,	Eng. and Mod. Lang.
Mather, Althea Susan.	*Joliet*,	Eng. and Mod. Lang.
Munhall, Grace May,	*Champaign*,	Eng. and Mod. Lang.
Noble, Isabelle,	*Urbana*,	Eng. and Mod. Lang.
Noble, Mary Elizabeth,	*Urbana*,	Eng. and Mod. Lang.
O'Brien, Marguerite Helen,	*Champaign*,	Chemistry.
Parker, Nettie Florence,	*Champaign*,	Natural Science.
Read, Kate,	*Grand Ridge*,	Eng. and Mod. Lang.
Shlaudeman, Maud,	*Decatur*,	Eng. and Mod. Lang.
Smith, Mayme Lucy,	*Tuscola*,	Eng. and Mod. Lang.
Sparks, Marion Emeline,	*Marseilles*,	Classical.
Stewart, Grace Adele,	*Champaign*,	Eng. and Mod. Lang.
Wilcox, Mae,	*Champaign*,	Natural Science.
Wilder, Elizabeth Cutler,	*Champaign*,	Eng. and Mod. Lang.
Wilkinson, Luella Jane,	*Argenta*,	Natural Science.

PREPARATORY CLASS.

Allen, John L,	*Roodhouse*,	Natural Science.
Armstrong, John Walter,	*Champaign*,	Natural Science.
Ball, Elmer Newton,	*Mitchellville, Ia.*,	Architecture.
Barker, Robert Collyer,	*Peoria*,	Electrical Engineering.
Barker, William Prentice, Jr.,	*Batavia*,	Civil Engineering.
Barr, George Andrew,	*Wilton Center*,	Eng. and Mod. Lang.
Bartlett, Warren,	*Mt. Sterling*,	Elec. Engineering.
Beasley, Robert Lee,	*Champaign*,	Civil Engineering.
Berry, Charles Jenkins,	*Guthrie Center, Ia.*,	Architecture.
Blake, Burton Aaron,	*Tiskilwa*,	Architecture.
Blakslee, James Woodberry,	*Kinmundy*,	Eng. and Mod. Lang.
Block, Richard Arthur,	*Sidney*,	Architecture.
Boal, Edward Tracy,	*Buda*,	Eng. and Mod. Lang.
Bohn, Paul,	*Chicago*,	Architectural Engineering.
Boone, Allen,	*Chrisman*,	Mechanical Engineering.
Bosworth, Carroll Arthur,	*Chicago*,	Civil Engineering.
Branch, James,	*Seymour*,	Eng. and Mod. Lang.
Braucher, Ralph Waldo,	*Lincoln*,	Agriculture.
Brockman, John,	*Davenport, Ia.*,	Elec. Engineering.
Brode, Luther David,	*Buda*,	Electrical Engineering.
Burroughs, Edward,	*El Paso*,	Civil Engineering.
Butz, Wallace Buell,	*Potomac*,	Chemistry.
Butz, Warren Robert,	*Potomac*,	Mechanical Engineering.
Campbell, George Henry,	*Edgewood*,	Eng. and Mod. Lang.
Carpenter, Millard Fillmore,	*Chicago*,	Civil Engineering.
Carpenter, Oliver Elijah,	*Chicago*,	Mechanical Engineering.
Carper, John Irving,	*Buda*,	Classical.
Chester, Earle,	*Champaign*,	Electrical Engineering.
Chester, Guy Jacob,	*Champaign*,	Natural Science.
Church, George Leonard,	*Athanta*,	Eng. and Mod. Lang.
Clifford, John James,	*Farmer City*,	Electrical Engineering.
Coleman, Don Valentine,	*Sandwich*,	Agriculture.
Coleman, William Munson,	*Bradford*,	Architecture.
Davis, George Francis,	*Roseville*,	Agriculture.
deVries, Steven George,	*Pekin*,	Electrical Engineering.
deAnguera, Homer,	*Chicago*,	Civil Engineering.
Dighton, William,	*Monticello*,	Natural Science.
Dill, Arthur Williams,	*Richmond, Ind.*,	Mech. Engineering.
Dubsky, John Joseph, Jr.,	*Chicago*,	Civil Engineering.
Dunkin, Will Van,	*Blue Grass*,	Classical.

Eaton, Henry Cassius,	*Fulton*,	Architecture.
Edmiston, Frank Everett,	*Olney*,	
Edwards, Arthur Robinson,	*Smithshire*,	Mech. Engineering.
Eichinger, Will,	*Decatur*,	Mechanical Engineering.
Fitzgerald, John Richard,	*Bethany*,	Eng. and Mod. Lang.
Flanigan, Edwin Clark,	*Champaign*,	Eng. and Mod. Lang.
Forbes, Ernest Browning,	*Urbana*,	Natural Science.
Frees, Herman,	*Chicago*,	Chemistry.
Graham, Arthur,	*Alexis*,	Mechanical Engineering.
Graham, Hugh,	*Illiopolis*,	Civil Engineering.
Green, Frank Hopkins,	*Ivesdale*,	Mechanical Engineering.
Haggard, William Thomas,	*Farmer City*,	Classical.
Haley, Arthur Fenn,	*Champaign*,	Mech. Engineering.
Hamilton, Charles Sinclair,	*Ashland*,	Civil Engineering.
Hammers, Jesse,	*Champaign*,	Classical.
Hammers, Morgan J,	*Champaign*,	Mech. Engineering.
Heath, Noble Porter, Jr.	*White Heath*,	Mech. Engineering.
Herman, Fred William,	*Freeburg*,	Electrical Engineering.
Herwig, George Washington,	*Mason City*,	Agriculture.
Hindman, John,	*Urbana*,	Eng. and Mod. Lang.
Hisey, Homer Roy,	*Nashville*,	Natural Science.
Hoblit, Charles Timmons,	*Lincoln*,	Electrical Engineering.
Horn, Carl John,	*Naperville*,	Architect. Engineering.
Howard, George Augustus, Jr.,	*Los Angeles, Cal.*,	Arch'l Engineering.
Howison, Charles,	*Sandwich*,	Architecture.
Hulla, John Edward,	*Chicago*,	Architectural Engineering.
Huston, Fred Thales,	*Blandinsville*,	Natural Science.
Jewett, Milford Elvin,	*Keokuk, Ia.*,	Architecture.
Jones, Walter Wynn,	*Chicago*,	Civil Engineering.
Kappes, Edward Fred,	*Chicago*,	Electrical Engineering.
Kayler, Samuel Henry,	*Decatur*,	Civil Engineering.
King, Wesley Edward,	*Champaign*,	Eng. and Mod. Lang.
Kingsland, Norris,	*Media*,	Mechanical Engineering.
Kirkpatrick, Harold H,	*Mayview*,	Classical.
Kunze, Ewald Edwin,	*Belvidere*,	Civil Engineering.
Kruse, Conrad Fred,	*Davenport, Ia.*,	Architecture.
Lantz, Simon Everett,	*Carlock*,	Natural Science.
Lattan, Harry Haigler,	*Austin*,	Mechanical Engineering.
Little, Frank George,	*Mt. Sterling*,	Electrical Engineering.
Lutz, Otto Bernard,	*Gardner*,	Electrical Engineering.
McConney, Porter David,	*Peoria*,	Mechanical Engineering.

McCormick, Olin,	*Gibson City*,	Electrical Engineering.
McGalliard, Arthur Gibbs,	*Lincoln*,	Electrical Engineering.
McKee, James Harry,	*Chicago*,	Mechanical Engineering.
McKnight, Robert Wade,	*Girard*,	Eng. and Mod. Lang.
McMullen, Charles,	*Kewanee*,	Civil Engineering.
McMullen, Harvey Clinton,	*Kewanee*,	Chemistry.
Marker, William Franklin,	*Champaign*,	Architecture.
Marsh, Norman Foote,	*Upper Alton*,	Architecture.
Maxwell, Irvine William,	*Savoy*,	Electrical Engineering.
Maxwell, John Riley,	*Keokuk, Ia.*	
Mesiroff, Josef,	*Chicago*,	Electrical Engineering.
Mettler, Joseph Ferdinand,	*Rankin*,	Latin.
Meyer, Harry,	*Davenport, Ia.*,	Mech. Engineering.
Millar, Adam Vanse,	*Mattoon*,	Civil Engineering.
Miller, Frank Arthur,	*Chicago*,	Mechanical Engineering.
Minnick, Guy Forest,	*Kewanee*,	Mechanical Engineering.
Mitchell, George White,	*Chicago*,	Architecture.
Morgan, Gilbert Ward.	*Kinmundy*,	Eng. and Mod. Lang.
Morgan, Walter Montgomery,	*Kinmundy*,	Eng. and Mod. Lang.
Morrissey, Matthew James,	*Champaign*,	Chemistry.
†Morse, Albert Cornelius,	*Tremont.*	
Mueller, Arnold William,	*Allegheny, Pa.*,	Architecture.
Muse, Ernest,	*Metropolis*,	Architecture.
Newcomer, Joseph Hardin,	*Petersburg*,	Mechanical Engineering.
Noble, Harry Charles,	*Champaign*,	Eng. and Mod. Lang.
Ocheltree, Clifford Elwin,	*Homer*,	Eng. and Mod. Lang.
Olmstead, Roy,	*Prophetstown*,	Elec. Engineering.
Oyler, Harry Schuyler,	*Mt. Pulaski*,	Chemistry.
Parker, Walter Asbury,	*Decatur*,	Eng. and Mod. Lang.
Patterson, Harold Vincent,	*Tacoma, Wash.*,	Elec. Engineering.
Pepper, William Allen,	*Joliet*,	Electrical Engineering.
Perry, George Granison,	*Urbana*,	Architecture.
Perry, James Alfred,	*Woodstock*,	Architecture.
Philbrook, Lowell Mason,	*Normal*,	Electrical Engineering.
Phillips, Pren Riley,	*Beecher City*,	Natural Science.
Phillips, William Oliver,	*Chicago*,	Architecture.
Pinkerton, Cyrus Bertram Eugene,	*Rantoul*,	Classical.
Poole, Edward Warren,	*Dover*,	Electrical Engineering.
Pratt, Walter Merrill,	*Earlville*,	Mechanical Engineering.
Price, Charles Jacob,	*Forreston*,	Chemistry.
Prince, Henry Adelbert,	*East Syracuse, N. Y.*,	Architecture.

Ray, James Paul,	*Chicago*,	Mining Engineering.
Rayburn, Charles Clyde,	*Roseville*,	Eng. and Mod. Lang.
Read, Frank Albert,	*Lily Lake*,	Eng. and Mod. Lang.
Rice, Fred Lee,	*Champaign*,	Eng. and Mod. Lang.
Riess, John Turk,	*Red Bud*,	Natural Science.
Roberts, Arista Irven,	*Danville*,	Eng. and Mod. Lang.
Robinson, Glenn,	*Philo*,	Chemistry.
Saunders, Rome Clark,	*Champaign*,	Electrical Engineering.
Sayers, William Wesley,	*Champaign*,	Mechanical Engineering.
Schrader, David Augustus,	*Eliza*,	Engineering.
Schroeder, John Lewis,	*Davenport, Ia.*,	Elec. Engineering.
Scott, George Harvey,	*Rantoul*,	Eng. and Mod. Lang.
Shepardson, Ralph Steel,	*Aurora*,	Architecture.
Simmons, Norton Andrews,	*Brighton*,	Electrical Engineering.
Sloan, John,	*Brimfield*,	Natural Science.
Smith, Albert James,	*Homer*,	Chemistry.
Smolt, Alfred Ernest,	*Paw Paw*,	Chemistry.
Sperry, James Franklin,	*Champaign*,	Mechanical Engineering.
Stare, Burton Reeme,	*Sibley*,	Electrical Engineering.
Steinwedell, George Otto,	*Quincy*,	Electrical Engineering.
Stibolt, John Peter,	*Davenport, Ia.*,	Architecture.
Stone, Lycias Craig,	*Weldon*,	Natural Science.
Stone, Lycurgus Hollenbeck,	*Weldon*,	Civil Engineering.
Stoolman, Winfield,	*Champaign*,	Architecture.
Stuart, Charles Robert, Jr.,	*Cairo*,	Electrical Engineering.
Taylor, Frederick Dan,	*New Berlin*,	Electrical Engineering.
Thompson, Guy Andrew,	*Steward*,	Eng. and Mod. Lang.
Thornhill, Charles Calaware,	*Champaign*,	Mechanical Engineering.
Townsend, Edmund Dell,	*Champaign*,	Electrical Engineering.
Trailor, Charles Clifton,	*Gibson City*,	Chemistry.
Trevett, Ross Lennington,	*Champaign*,	Electrical Engineering.
Trickey, Hardy Deland,	*Winchester*,	Electrical Engineering.
Vail, Richard Randolph,	*Lone Tree*,	Civil Engineering.
Vandeventer, Homer Givens,	*Mt. Sterling*,	Agriculture.
Vigal, William Myron,	*Edinburg*,	Electrical Engineering.
Voris, Alvin Coe,	*Neoga*,	Electrical Engineering.
Wallace, John Edgar,	*Neoga*,	Mechanical Engineering.
Webber, Hubert Anthony,	*Mt. Vernon*,	Architecture.
Weeks, Charles Henry,	*Upper Alton*,	Architecture.
Wemhaner, George Adolph,	*Warsaw*,	Electrical Engineering.
Willard, Edward,	*Roseville*,	Engineering.

Woolner, Edward Sigmund,	*Peoria*,	Electrical Engineering.
Wright, Frank Eviss,	*Mahomet*,	Mechanical Engineering.
Zimmerman, Walter,	*Champaign*,	Mechanical Engineering.
Brownlee, Mary Lavinia,	*Urbana*,	Latin.
Buck, Luella Eugenia,	*Champaign*,	Natural Science.
Campbell, Maude Permill,	*Urbana*,	
Carswell, Jessie Whyte,	*New City*,	Chemistry.
Chester, Florence,	*Champaign*,	Eng. and Mod. Lang.
Chester, Mary,	*Champaign*,	Eng. and Mod. Lang.
Cross, Daisy,	*Rantoul*,	Eng. and Mod. Lang.
†Folger, Cloa Tillie,	*Ridge Farm*,	Eng. and Mod. Lang.
Henderson, Minnie,	*Ridge Farm*,	Classical.
Herme, Marcella,	*Champaign*,	Eng. and Mod. Lang.
Kent, Jennie Isabella,	*Urbana*,	Eng. and Mod. Lang.
Kerns, Mazie White,	*Champaign*,	Natural Science.
Lincoln, Abbie Adelaide,	*Hammond*,	Eng. and Mod. Lang.
Mandeville, Elizabeth Elma,	*Philo*,	Natural Science.
Mason, Mildred Eliza,	*Plainfield*,	Eng. and Mod. Lang.
Merrill, Emily,	*Abilene, Kan.*,	Natural Science.
Moore, Minnie Rose,	*French Grove*,	Eng. and Mod. Lang.
Moss, Antoinette Leslie,	*Baldwinsville, N. Y.*,	E. and M. Lang.
Northam, Lottie Alice,	*Nora*,	Natural Science.
O'Bryan, Wilhelmine,	*Champaign*,	Natural Science.
O'Neill, Marian Madeline,	*Champaign*,	Eng. and Mod. Lang.
Peck, Harriet Stella,	*Fisher*,	Eng. and Mod. Lang.
Peck, Millicent Orville,	*Fisher*,	Latin.
Raynor, Clara Mae,	*Champaign*,	Classical.
Spry, Zua,	*Sidell*,	Classical.
Starkweather, Pearl Belle,	*Champaign*,	Eng. and Mod. Lang.
Stone, Sarah Effie,	*Weldon*,	Eng. and Mod. Lang.
Tower, Blanche Jennie,	*Chana*,	Architecture.
Walker, Cora Elizabeth,	*St. Joseph*,	Eng. and Mod. Lang.
Webster, Sarah Emeline,	*Champaign*,	Eng. and Mod. Lang.

SPECIAL STUDENTS.

Allen, James Charles.	*Rockford*,	Architect. Engineering.
Andermann, William Fred,	*Lace*,	Agriculture.
Atkins, Herbert,	*Lincoln*,	Agriculture.

† Deceased.

Barter, Duncan Mac,	*Attila*,	Agriculture.
Brayshaw, Walter Washington,	*Peoria*,	Chemistry.
Cunnington, Edwin Ralph,	*Champaign*,	Art and Design.
Elliott, Leroy Gleason,	*Brooklyn, Ia.*,	Agriculture.
Fairbank, William John,	*St. Louis, Mo.*,	Architecture.
Frazier, William Jackson,	*Villa Grove*,	Agriculture.
Freeland, David E,	*Bethany*,	Agriculture.
Freeland, William Thomas,	*Windsor*,	Agriculture.
Gillespie, Thomas Morton,	*Marissa*,	Agriculture.
Helms, Edward Samuel,	*Belleville*,	Agriculture.
Kamp, John,	*Tolono*,	Agriculture.
Kamp, Peter,	*Tolono*,	Agriculture.
Keator, William Chauncey,	*Rock Island*,	Chemistry.
Leeper, Robert,	*Unionville*,	Agriculture.
Lindsay, Thomas Edward,	*Urbana*,	Physics.
McFadden, Sidney,	*Time*,	Agriculture.
Moody, Samuel Franklin,	*Bethany*,	Agriculture.
Moore, Frank,	*Elvaston*,	Agriculture.
Morrow, Clarence Gifford,	*Champaign*,	Agriculture.
Myers, George Fortune,	*Danville*,	Veterinary Science.
Ogden, Joseph,	*Champaign*,	Agriculture.
Ogden, Thomas,	*Champaign*,	Agriculture.
Osterhage, Louis Henry,	*Vincennes, Ind.*,	Architecture.
Pfeil, Charles Oscar,	*Arenzville*,	Architecture.
Robison, James Charles,	*El Dorado, Kan.*,	Agriculture.
Rock, John Henry,	*Sadorus*,	Agriculture.
Saunders, Oliver Clinton Thornton,	*Champaign*,	Chemistry.
Schneck, Sereno,	*Mt. Carmel*,	
Seavey, Albion Moses,	*Prairieville*,	Agriculture.
Shearer, Hallock,	*Gard's Point*,	Agriculture.
Skeavington, George,	*Albion*,	Agriculture.
Thomas, Bertrand,	*Kickapoo*,	Agriculture.
Thomas, Lauren,	*Kickapoo*,	Agriculture.
Tilton, James Fredrick,	*Hoopeston*,	Agriculture.
Vanderkloot, Marinus Adrain,	*Chicago*,	Art and Design.
Wood, Harry Milner,	*Delavan*,	Agriculture.
Woulfe Daniel,	*Clarence*,	Agriculture.
Beattie, Carrol E.,	*Champaign*,	Art and Design.
Besore, Ida May,	*Urbana*,	Art and Design.
Broaddus, Florence Earl,	*Urbana*,	History.

Brown, Ina Doane,	*Urbana*,	Art and Design.
Carter, Carrie Mabel,	*Champaign*,	Art and Design.
Gardner, May Emma,	*Gilman*,	Music.
Gillespie, Clara Bell,	*Portland Station, O.*,	Art and Design.
Hill, Mary,	*Champaign*,	Music.
Hiserodt, Sadie,	*Urbana*,	Art and Design.
Leal, Mary Cloelia,	*Urbana*,	Art and Design.
McIntosh, Mabel Charlotte Urquhart	*Champaign*,	Modern Languages.
McIntosh, Winifred Wilhelmina Stuart,	*Champaign*,	Modern Languages.
Paradis, Mrs. Martha Ann,	*Urbana*,	Modern Languages.
Richards, Gertrude,	*Urbana*,	Art and Design.
Saye, Agnes,	*Champaign*,	Modern Languages.

SUMMARY.

Courses and Classes.	Graduate School..	Resident Graduates	Senior.....	Junior.....	Sophomore.....	Freshman.....	Preparatory.....	Special.....	Total { Men.....	Total { Women..	Total.....
Agriculture, Men.....			2	1		4	5	29	41		41
Mechanical Engineering, Men		1	3	3	18	28	26		79		79
Electrical Engineering, Men.			4	11	7	35	36	1	94		94
Civil Engineering, Men.....		1	12	15	20	27	17		92		92
Mining Engineering, Men ...				2	1	3	1		7		7
Municipal Engineering, Men.						1			1		1
Architecture { Men		1	10	16	17	27	23	3	97		99
Architecture { Women						1	1			2	
Architectural Engineer'g, Men					6	4	4	1	15		15
Chemistry { Men		1	9	6	13	10	10	3	52		54
Chemistry { Women.....						1	1			2	
Natural History { Men	1		7	8	8	13	12		49		72
Natural History { Women ..	1	1		2	7	6	6			23	
Art and Design { Men.....								2	2		10
Art and Design { Women....								8		8	
Music, Women	1							2		3	3
English and Modern Languages { Men			10	6	7	9	22		54		106
English and Modern Languages { Women .			6	3	4	18	16	5		52	
Latin { Men			1	3	2	1	1		8		13
Latin { Women				2	1		2			5	
Classical { Men	1		2	1	1	4	6		15		23
Classical { Women			1	1	1	2	3			8	
Not Specified { Men							3	1	4		5
Not Specified { Women							1			1	
Total { Men	2	4	60	72	100	166	166	40	610		
Total { Women	2	1	7	8	13	28	30	15		104	
Total	4	5	67	80	113	194	196	55			714

HOLDERS OF SCHOLARSHIPS, PRIZES AND COMMISSIONS.

HONORARY SCHOLARSHIPS.

The following named counties have been represented during the year by the students named:

Adams,	Woodruff, Thomas Tyson.
Brown,	Bartlett, Henry Emmett.
Bureau,	Bryant, Lester Peck.
Champaign,	Marble, Harry Curtis.
Clinton,	Earl, Mark Alden.
Cook,	Bailey, Leonard Lionel.
Crawford,	Templeton, Benjamin Franklin.
Douglas,	Carmack, Clyde Robert.
Du Page,	Heideman, George Hermann.
Ford,	Lowry, James Percival.
Hancock,	Ketchum, Richard Bird.
Kane,	Shepardson, John Eaton.
La Salle,	Sparks, Marion Emeline.
Livingston,	Holtzman, Stephen Ford.
Marion,	Row, George Edward.
Ogle,	Woolsey, Ola C.
Peoria,	Beasley, Harrison Eaton.
Rock Island,	Johnson, Harriette Augusta.
Sangamon,	Porter, Robert Knight.
Scott,	Gibbs, William David.
Tazewell,	Van Ostrand, Charles Edwin.
Washington,	Ayers, Clarence Otto.
Whiteside,	Reeves, Harley Edson.
Winnebago,	Carpenter, Frank Albert.

CHICAGO CLUB LOAN FUND.

Chapman, Paul Reed.
Karpen, Julius.

WINNERS IN JUNIOR PRIZE SPEAKING CONTEST.

Chambers, William Rock, First Prize.
Lamkin, Nina Belle, Second Prize.
Carter, Charles Willard, Third Prize.

COMMISSIONED BY THE GOVERNOR AS CAPTAINS BY BREVET IN THE ILLINOIS NATIONAL GUARD, 1892.

Burrows, Park Tunis, Mather, Roy Allen.

SPECIAL COMMENDATION.

The following have been named to the Secretary of War as worthy of special commendation:

Burrows, Park Tunis, Mather, Roy Allen.

WINNER OF HAZELTON PRIZE MEDAL, 1892.

Atwood, Levi Patten.

ROSTER OF OFFICERS AND NON-COMMISSIONED OFFICERS OF THE BATTALION FOR 1892-3.

Major, M. A. Earl; Captain (unassigned), J. T. Stewart.
Adjutant-First Lieutenant, C. W. Noble.
Sergeant Major, W. N. Vance.
Color Sergeant, L. E. Roby.

Co. "A"—First Lieutenant, E. V. Capps; 1st Sergeant, J. A Green; Corporals, R. P. Brower, G. H. Scott, W. Brenke, M. E. Whitham, J. H. McKee.

Co. "B"—First Lieutenant, F. L. Busey; 1st Sergeant, L. A. MacGregor; Corporals, J. Karpen, L. J. Sexton, W. H. Lienesch, G. A. Howard.

Co. "C"—First Lieutenant, J. E. Shepardson; 1st Sergeant, J. C. Quade; Corporals, F. H Green, R. K. Porter, C. R. Vickery, H. I. Keck.

Co. "D"—First Lieutenant, A. M. Munn; 1st Sergeant, H. E. Reeves; Corporals, J. T. Riess, G. E. Row, R. P. Manard, C. A. Risor.

Artillery Detachment—Captain, C. D. Brownell; 1st Sergeant, P. B. Randall; Corporal, W. T. Pierce.

Band—C. M. Lewis, Drum Major; R. W. Sharpe, Leader.

1893.

SEPTEMBER.

S	M	T	W	T	F	S
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OCTOBER.

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NOVEMBER.

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DECEMBER.

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1894.

JANUARY.

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MARCH.

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APRIL.

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1894.

MAY.

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JUNE.

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JULY.

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AUGUST.

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1894.

SEPTEMBER.

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OCTOBER.

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NOVEMBER.

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DECEMBER.

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THE UNIVERSITY CALENDAR.

1893–94.

FALL TERM—1893.

Sept. 11, Monday.	Entrance examinations begin.
Sept. 11, 12, Monday and Tuesday.	Registration Days.
Sept. 13, Wednesday.	Instruction begins.
Nov. 30, Thursday.	Thanksgiving Recess.
Dec. 4, Monday.	Instruction resumed.
Dec. 18, Monday.	Term Examinations begin.
Dec. 20, Wednesday.	Term ends.

WINTER TERM—1894.

Jan. 2, Tuesday.	Entrance Examinations.
Jan. 2, 3, Tuesday and Wednesday.	Registration Days.
Jan. 4, Thursday.	Instruction begins.
Jan. 8, Monday.	Latest date for announcing Subjects of Theses for Baccalaureate Degrees.
March 19, Monday.	Term Examinations begin.
March 20, Tuesday.	Term ends.

SPRING TERM—1894.

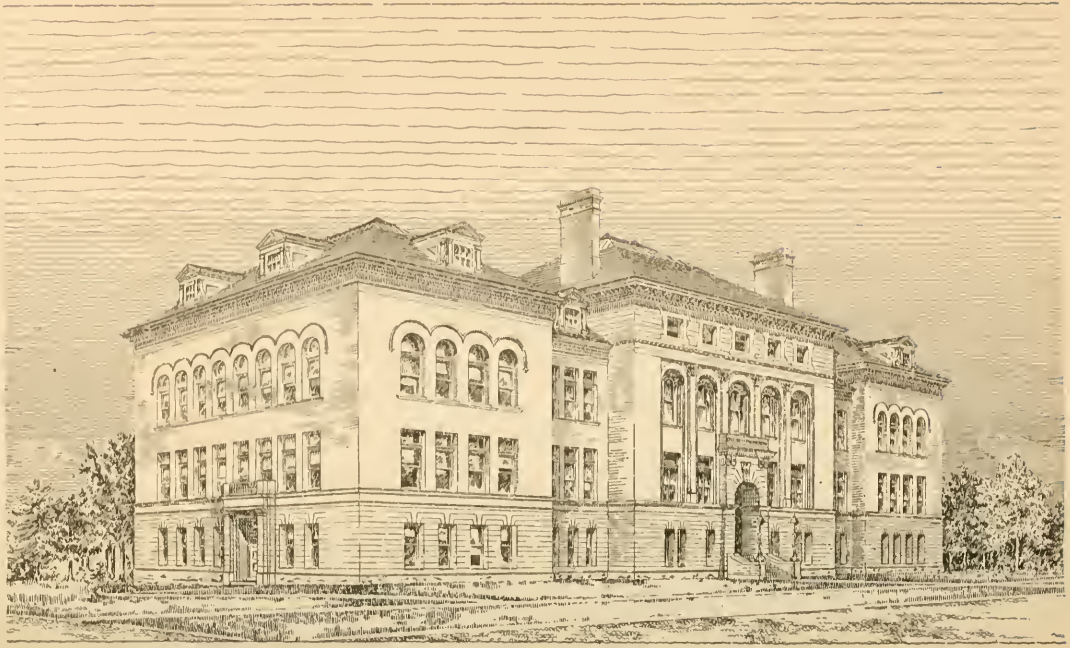
March 19, 20, Monday and Tuesday.	Registration Days.
March 21, Wednesday.	Instruction begins.
April 16, Monday.	Latest day for presenting Conklin Orations.

April 28, Saturday.	Latest day for presenting Commencement Theses and Orations.
May 24, Thursday.	Senior Examinations begin.
May 28, Monday.	Hazelton Prize Drill.
May 29, Tuesday.	Competitive Drill.
May 30, Wednesday.	Term Examinations begin.
June 3, Sunday.	Baccalaureate Address.
June 4, Monday.	Class Day.
June 5, Tuesday.	Alumni Day. Conklin Prize Orations.
June 6, Wednesday.	Twenty-third Annual Commencement.

FALL TERM—1894.

Sept. 10, Monday.	Entrance Examinations begin.
Sept. 10, 11, Monday and Tuesday.	Registration Days.
Sept. 12, Wednesday.	Instruction begins.
Nov. 29, Thursday.	Thanksgiving Recess.
Dec. 3, Monday.	Instruction resumed.
Dec. 20, Thursday.	Term Examinations begin.
Dec. 21, Friday.	Term ends.

Then let us not leave the meaning of education ambiguous or ill-defined. At present, when we speak in terms of praise or blame about the bringing-up of each person, we call one man educated and another uneducated, although the uneducated man may be sometimes very well educated for the calling of a retail trader, or of a captain of a ship, and the like. For we are not speaking of an education in this narrower sense, but of that other education in virtue from youth upwards, which makes a man eagerly pursue the ideal perfection of citizenship, and teaches him how rightly to rule and how to obey. This is the only education which, upon our view, deserves the name; that other sort of training, which aims at the acquisition of wealth or bodily strength, or mere cleverness, apart from intelligence and justice, is mean and illiberal, and is not worthy to be called education at all. But let us not quarrel with one another about a word, provided that the proposition which has been granted hold good, to-wit: That those who are rightly educated generally become good men. Neither must we cast a slight upon education, which is the first and fairest thing that the best of men can ever have, and which, though liable to take a wrong direction, is capable of reformation. And this work of reformation is the great business of every man while he lives.—*Plato*, Laws, iv. 173.



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OF THE

UNIVERSITY OF ILLINOIS

(Post Office, Champaign, or Urbana, Ill.)

1893-94

URBANA, ILLINOIS,
PUBLISHED BY THE UNIVERSITY.

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UNIVERSITY OF ILLINOIS.

The University of Illinois has its seat in Champaign county, in the eastern central part of the state, between the twin cities of Champaign and Urbana, within the corporate limits of the latter. It is one hundred and twenty-eight miles southward from Chicago, at the junction of the Illinois Central, the Cleveland, Cincinnati, Chicago and St. Louis, and the Wabash railways. The situation is a beautiful one, and the "art that doth mend nature" has added rare charms to the grounds and surroundings. The country around is one of the richest and most prosperous agricultural regions of the world, and the local municipalities, with a combined population of 11,000, are noted for public spirit and high moral tone.

HISTORY.

In 1862 the national government donated to each state in the Union public land scrip apportioned in quantity equal to 30,000 acres for each senator and representative in congress, "for the endowment, support and maintenance of at least one college, whose leading object shall be, without excluding other scientific and classical studies, and including military tactics, to teach such branches of learning as are related to agriculture and the mechanic arts, * * * * * in order to promote the liberal and practical education of the industrial classes in the several pursuits and professions of life."

Under this act Illinois received scrip for 480,000 acres of land subject to location in any surveyed but unoccupied part of the public domain, and 25,000 acres were thus located in Nebraska and Minnesota, while the remainder of the scrip was sold for what could be obtained. Of the land, about 14,000 acres have been sold at from $10.00 to $15.00 an acre. In compensation for waiting something more than a quarter of a century, the land thus secured has added and will add to the endowment fund nearly as much as was obtained for the vastly greater proportion of the scrip originally sold. The entire principal sum received from the sale of scrip and of land is held inviolate as endowment, the income only being available for current expenditures.

To secure the location of the University several counties entered into sharp competition by proposing to donate to its use named sums of money, or its equivalent. Champaign county offered a large brick building, erected for a seminary and nearly completed, about 1,000 acres of land for a campus and adjoining farms, and $100.000 in county bonds. To this the Illinois Central railroad added $50,000 in freight.

The state legislature has from time to time appropriated various sums for permanent improvements, as well as for maintenance. The present value of the entire property and assets is estimated at $1,375,000.

The institution was incorporated under the name of the Illinois Industrial University the last day of February, 1867, and placed under the control of a board of trustees constituted of the governor, the superintendent of public instruction, and the president of the state board of agriculture, as *ex-officio* members, and twenty-eight citizens appointed by the governor. The chief executive officer, usually called president, was styled Regent, and he was made, *ex-officio*, a member of the board and presiding officer both of the board of trustees and of the faculty.

In 1873 the board of trustees was reorganized by the reduction of the number of members by appointment to nine and *ex-officio* to two, the governor and the president of the state board of agriculture. In 1887 a law was passed making membership elective at a general state election and restoring the superintendent of public instruction as an *ex-officio* member. There are, therefore, now three *ex-officio* members and nine by public suffrage. Since 1873 the president of the board has been chosen by the members thereof from among their own number, for a term of one year.

In consideration of the offer of Champaign county the institution was located, May 8, 1867, in the suburbs of Urbana, adjoining those of Champaign. For greater convenience most use has been made of the postoffice of the latter place. The University was open to students March 2, 1868, at which time there were present, beside the Regent, three professors, and about fifty students, mostly from the vicinity. During the first term another instructor was added, and there was a total enrollment of 77 students, all young men.

During the first term classes were instructed in algebra, geometry, natural philosophy, history, rhetoric, and Latin. Along with this, work on the farm and gardens or around the buildings was compulsory for all students. But in March of the next year compulsory labor was discontinued, save when it was made to serve as a part of class instruction. A chemical laboratory was fitted up during the autumn of 1868, and students then began practical work in the department. Botanical laboratory

work was commenced the following year. In January, 1870, a temporary mechanical shop was fitted up with tools and machinery, and in this little wooden building, originally constructed for a carpenter shop, was begun the *first shop-instruction* in American universities. During the summer of 1871, a large brick structure, the present Machinery Hall, was erected and equipped for students' shop work in both wood and iron, and in 1876 a diploma of merit was awarded for the exhibition in this line made at the Centennial Exposition.

By vote, March 9, 1870, the trustees admitted women as students, and during the year 1870-71, twenty-four availed themselves of the privilege. Since that time they have constituted about one-sixth to one-fifth of the total number of students. In 1875 a course in domestic science and art was organized. This was maintained five years, when, upon the withdrawal of the professor in charge, it was abandoned.

By the original state law certificates showing the studies pursued and the attainments in each were substituted for the usual diplomas and degrees. The certificates not proving satisfactory to the holders, the alumni petitioned the legislature in 1877 to give the University authority to confer degrees, and such authority was granted.

Again, upon motion of members of the alumni, seconded by trustees and faculty, the legislature was asked in 1885 to change a former action by that body. The word *industrial*, as used in connection with public institutions, had become associated with those of a penal or reformatory kind, and, in consequence, many ludicrous and sometimes embarrassing mistakes were made as to the character and purpose of the University. Instead of the splendid conception of high, collegiate education, preparatory to and in aid of the great industries of the age, people were too often led to suppose the state had provided a place for destitute children or for young culprits. From the beginning the institution had been recognized as the state University, and all the discussion leading to its establishment was based upon this idea. No change was now sought in its character or in its relations, but a name better expressive to the public mind of that character and relation was desired. The industrial University became the University of Illinois.

During the same session of the legislature a bill was passed transferring the State Laboratory of Natural History from the Illinois State Normal University to the University of Illinois. This laboratory was created by law for the purpose of making a natural history survey of the state, with the publication of the results in series of bulletins and reports, and for the allied purpose of furnishing specimens illustrative of the flora and fauna of the state to the public schools, and to the state museum.

For these purposes direct appropriations are made by the legislature from session to session. A large amount of material has been collected and extended publications have been made in both the forms above mentioned.

By an act approved March 2, 1887, the national government appropriated $15,000 per annum to each state for the purpose of establishing and maintaining, in connection with the colleges founded upon the congressional act of 1862, an agricultural experiment station, "to aid in acquiring and diffusing among the people of the United States useful and practical information on subjects connected with agriculture, and to promote scientific investigation and experiment respecting the principles and applications of agricultural science." Under this provision the station for Illinois was placed under the direction of the trustees of the University and its grounds were located on the University farm. At least one bulletin of results is published every three months, and they are for gratuitous distribution. Editions of 14,000 copies are now issued.

For the more complete endowment of the state institutions founded upon the act of 1862, the congress of the United States made further appropriations by a supplementary law passed in 1890. Under this enactment each such college or university received the first year $15,000, the second $16,000, and likewise thereafter $1,000 per annum additional to the amount of the preceding year. The annual increase is to continue until the amount reaches $25,000, which sum is then to be paid yearly thereafter. Putting the congressional aids together there is made an exceedingly encouraging example for the state authorities to imitate. It cannot be said that the Illinois legislature has in the past contributed liberally to the University, but a disposition to do so has been much more manifest in recent sessions of that body. Besides $70,000 for a science building, the 37th General Assembly (1891) appropriated for the use of the University for two years the sum of $65,044.23, and the 38th (1893) passed appropriations for an engineers' building, $160,000, and for other purposes for two years $135,700. To date the total appropriations by the state to the University for all purposes whatsoever amount to $879,900.

It has been mentioned that 77 students attended the first term in 1868. The total enrollments for the succeeding years to the present are as follows: 128, 180, 274, 381, 400, 405, 368, 370, 388, 387, 399, 414, 382, 352, 382, 330, 332, 362, 343, 377, 417, 469, 519, 583, 714, 743.

It will be noted that for the last ten years each year, with a single exception, shows a gain over that preceding. The year's gain for 1892-93 was much the greatest, reaching 21 per cent over the attendance

for 1892 and nearly 40 per cent over that for 1891. Financial difficulties materially affected the enrollment this year (1893-94). The following table gives details of attendance since 1881-82:

ATTENDANCE OF STUDENTS IN THE SEVERAL DEPARTMENTS OF THE UNIVERSITY, FOR THE YEARS 1881-82 TO 1893-94.

YEAR.	Agriculture	Mechanical Engineering	*Electrical Engineering	Civil Engineering	†Municipal and Sanitary Engineering	Mining Engineering	Architecture	†Architectural Engineering	Chemistry	‡Pharmacy	Natural History	Art and Design	English and Modern Languages	Ancient Languages	Unclassified	Men	Women	Total
1881-82.	21	41	....	41	....	3	14	..	42	..	14	4	119	4	40	276	76	352
1882-83.	28	39	....	52	....	3	18	..	40	..	11	7	117	15	47	289	93	382
1883-84.	24	45	....	51	....	2	21	..	26	..	17	6	94	8	43	261	69	330
1884-85.	21	56	....	58	....	1	26	..	23	..	20	11	102	4	34	292	70	362
1885-86.	25	53	....	43	....	3	24	..	27	..	18	8	102	7	19	269	63	332
1886-87.	29	65	....	45	....	4	28	..	25	..	21	5	84	6	31	289	54	343
1887-88.	23	57	....	53	....	4	46	..	15	..	34	14	85	8	39	305	72	377
1888-89	16	74	....	62	....	6	59	..	20	..	54	9	85	14	19	346	71	417
1889-90.	14	78	....	71	....	6	61	..	40	..	53	3	101	15	27	392	77	469
1890-91.	22	78	1	95	....	5	73	..	51	..	51	4	95	17	27	444	75	519
1891-92.	11	88	29	87	....	6	92	..	45	..	53	7	104	17	44	494	89	583
1892-93.	40	82	87	93	1	7	98	15	52	..	71	10	106	36	16	610	104	714
1893-94.	33	68	123	86	5	2	101	14	44	10	74	14	110	54	4	634	109	743

*Not separately classified until 1890-91.
†Not separately classified until 1892.
‡Not separately classified until 1893.

This shows that the marked increase has been in certain of the courses of engineering. The number of students pursuing architectural studies is greater than at any other collegiate institution in this country.

BUILDINGS AND GROUNDS.

The land occupied by the University and its several departments embraces about 210 acres, including experimental farm, orchards, forest plantation, arboretum, ornamental grounds, and military parade grounds.

University Hall, designed wholly for public uses, occupies three sides of a quadrangle, measuring 214 feet in front and 122 feet upon the wings. The library wing contains in spacious halls the museum of natural history, the library, the art gallery, and the museum of industrial art. The chapel wing contains the chapel, the physical laboratory

and lecture room, and rooms occupied by the department of architecture, and of art and design. In the main front are convenient class rooms, and on the upper floor elegant halls for literary societies.

The Chemical Laboratory is a building 75 by 120 feet, and two stories high, besides well-lighted basement and mansard stories. It contains the general laboratories for students, instructors' laboratories, lecture rooms, store rooms, scale rooms, and various apartments for special purposes.

Machinery Hall is of brick, two stories high, 126 feet in length, and 88 feet in width. It contains the machine shop and mechanical wood shop on the second floor, together with tool rooms, pattern room and stock room. On the first floor is found the forge shop, foundry, wash room; architectural shops for carpentry and cabinet work, furnished with wood working machinery, stock rooms, as well as the Laboratory of Applied Mechanics and Hydraulics.

Natural History Hall is a handsome building, 134 by 94 feet, with basement, two main stories, and an attic. It is occupied by the departments of botany, zoölogy, physiology, mineralogy, and geology, for each of which there are laboratories, lecture rooms, and offices.

Military Hall, 100 by 150 feet in one grand hall, gives ample space for company and battalion maneuvers and for large audiences upon special occasions. It is also used as a gymnasium, for which there are dressing rooms with lockers. A bath room is provided.

Engineering Hall.—The new engineering building in process of erection will, it is hoped, be ready for occupancy at the opening of the fall term. The last legislature made an appropriation of $160,000 for this building, and it promises to be the handsomest structure on the campus. The trustees asked for competitive plans from the architectural graduates of this University, and awarded the first prize to George W. Bullard, Tacoma, Wash., of the class of 1882, who was made architect of the building.

The new building stands on the north side of Green street, midway between the north and south groups of buildings, facing the latter. It has a frontage of 200 feet, a depth on the wings of 76 feet and 138 feet in the center. The middle wing is 72 feet wide. The first story is of drab sandstone in twelve inch courses, having a tooth-chiseled finish and deeply chamfered horizontal joints. The three upper stories are of buff pressed brick with terra cotta trimmings to match. The interior is slow burning mill construction. The ceiling is paneled Washington fir, and the remainder of the interior finish is oak with bronze trimmings.

The first story of the west and central wings contains the laboratories of the department of electrical engineering, while the east wing is devoted to masonry, laboratories and instrument rooms of the department of civil engineering. The central wing of the second story contains the lecture room and the preparation rooms of the department of physics, and the remainder of the floor is used by the departments of civil and municipal engineering, for recitation and drawing rooms, cabinets and studies. The middle wing of the third story contains the laboratories of the department of physics, and the side wings the drawing rooms, lecture rooms, cabinets, and studies of the mechanical department. The center portion contains the library, the office, and the faculty parlor. The fourth story is devoted entirely to the department of architecture, and contains drawing and lecture rooms, cabinets, photo studio, and blue print laboratory.

There are, in addition to these buildings, a veterinary hall, a small astronomical observatory, three dwellings, two large barns, and a green house.

MUSEUMS AND COLLECTIONS.

The museum of zoölogy and geology occupies a hall 61 by 79 feet, with a gallery on three sides, and is completely furnished with wall, table, and alcove cases. It contains interesting and important collections, equaled at few, if any, of the colleges of the west. They have been specially selected and prepared to illustrate the courses of study in the school of natural history, and to present a synoptical view of the zoölogy of the state.

Zoölogy.—The mounted mammals comprise an unusually large and instructive collection of the ruminants of our country, including male and female moose, elk, bison, deer, antelope, etc., and also several quadrumana, large carnivora and fur-bearing animals, numerous rodents, good representative marsupials, cetaceans, edentates, and monotremes. Fifty species of this class are represented by eighty specimens.

The collection of mounted birds (about five hundred and fifty specimens of three hundred species) includes representatives of all the orders and families of North America, together with a number of characteristic tropical forms. Many of these specimens are excellent examples of artistic taxidermy. A series of several hundred unmounted skins is available for the practical study of species.

The set of skeletons contains examples of all the orders of mammals and birds except the Proboscidea, together with typical representatives of the principle groups of reptiles, amphibians, and fishes.

The cold-blooded vertebrates are also represented by a very useful collection of alcoholic specimens, plaster casts, and mounted skins of the larger species, both terrestrial and marine.

Embryology is illustrated by a set of Ziegler wax models, and several series of slides, sections, and other preparations.

Conchology is illustrated by several thousand shells belonging to seventeen hundred species; together with alcoholic specimens of all classes and orders. The collection of Illinois shells is fair, but incomplete.

The entomological cabinet contains about three thousand species (principally American), named, labeled, and systematically arranged.

The lower invertebrates are represented by several hundred dried specimens and alcoholics, and by a large series of the famous Blaschka glass models.

Botany.—The herbarium contains nearly all the species of flowering plants indigenous to Illinois, including a complete set of grasses and sedges. The flora of North America is fairly well represented, and a considerable collection of foreign species has been made. A collection of fungi includes a very full set of those most injurious to other plants, causing rusts, smuts, moulds, etc. A collection of wood specimens from two hundred species of North American trees well illustrates the varieties of native wood.

Plaster casts represent fruits of many of the leading varieties, as well as interesting specimens of morphology, showing peculiarities of growth, effects of cross-fertilization, etc.

Geology.—The geological collection comprises many of the largest and most remarkable fossils hitherto discovered in the various geological formations, illustrating the general progress of life in the mollusks, fishes, reptiles, and mammals, from the oldest paleozoic time to the present. A fine set of fossils from Germany, and collections suitably arranged for practical study, from this and other states, illustrate the different formations. There is a good collection of foot-prints from the Connecticut river sandstones.

Lithology.—This collection embraces the principal kinds of metamorphic and volcanic rocks; examples of stratification in the limestone and fragmental kinds, with many samples of such rocks as are found most valuable for building purposes.

Mineralogy.—The specimens of minerals show all the groups, and all the important and typical species. All the metals are represented; also many of their most important combinations. Many of the specimens are finely crystalized; these, with a complete set of imported models, fully illustrate crystallography.

Agriculture.—A collection of soils from different portions of Illinois and other states; many varieties of corn, wheat, and other cereals and seeds; specimens illustrating the official state inspection of grains at Chicago, showing the quality of the different grades recognized; models of agricultural inventions; models illustrating modes and materials for drains; casts of ancient plows; engravings, lithographs, and photographs of typical animals of noted breeds.

The farm gives good illustrations of farm buildings, implements, machinery, modes of culture, and of domestic animals of various classes.

Physics.—The cabinets of the physical laboratory contain a collection of apparatus from the most celebrated European and American makers, illustrating the subjects of mechanics, pneumatics, optics, and electricity.

A series of standard weights and measures from the office of the Coast and Geodetic Survey of the United States may be consulted at the physical laboratory.

MUSEUM OF INDUSTRIAL ARTS.

A large room is devoted to a museum of practical art, the materials for which are constantly accumulating in the various scientific departments. Prominent among the agricultural specimens here exhibited is an excellent collection of the sub-species and varieties of Indian corn, including the best of their kinds; a considerable collection of small grains and of grasses; a collection of fibres in various states of manufacture, and a series of analyses of grains, showing at a glance the elements and proportion of structure. The museum contains full lines of illustrations of the work of the shops; models made at the University or purchased abroad; drawings in all departments; Patent Office models, etc ; samples of building materials, natural and artificial; a large collection illustrating the forestry of Illinois, Florida, and California; with whatever may be secured that will teach or illustrate in this most important phase of university work. The exhibit made by the University at the Centennial and Cotton Exposition at New Orleans, finds a permanent abode in this apartment, and very large additions have been made of materials received from the Columbian Exposition of 1893.

A notable feature of this collection is the gift of Henry Lord Gay, architect, of Chicago. It consists of a model in plaster and a complete set of drawings of a competitive design for a monument to be erected in Rome, commemorative of Victor Emanuel, first king of Italy. The monument was to be of white marble, an elaborate Gothic structure, beautifully ornamented, and 300 feet high. Its estimated cost was to have

been seven and a quarter millions of francs. The design was placed by the art committee second on a list of 289 competitors. Mr. Gay's generous gift occupies the place of honor in the museum of industrial arts.

ART AND DESIGN.

The University art gallery was the gift of citizens of Champaign and Urbana. It occupies a beautiful hall, 61 by 79 feet, and the large display of art objects has surprised and delighted all visitors. In sculpture it embraces thirteen full size casts of celebrated statues, including the Laocoön group, the Venus of Milo, etc., forty statues of reduced size, and a large number of busts, ancient and modern, bas reliefs, etc., making over four hundred pieces. It includes also hundreds of large autotypes, photographs, and fine engravings, representing many of the great masterpieces of painting of nearly all the modern schools. Also a gallery of historical portraits, mostly large French lithographs of peculiar fineness, copied from the great national portrait galleries of France.

Other collections of special value to art students embrace a large number of casts of ornament from the Alhambra and other Spanish buildings, presented by the Spanish government; a set of casts from Germany illustrating German Renaissance ornament; series of art works from the Columbian Exposition, and large numbers of miscellaneous casts, models, prints, drawings, etc., such as are usually found in the best art schools.

LIBRARY.

The library, selected with reference to the literary and scientific studies required in the several courses, had, May 5, 1893, 25,500 volumes.

The large library hall, fitted up as a reading-room, is open throughout the day for study, reading and consulting authorities. It is intended that the use of the library shall largely supplement the class room instruction in all departments. Constant reference is made in classes to works contained in the library, and their study is encouraged or required. The reading room is well provided with American, English, French, and German papers and periodicals, embracing some of the most important publications in science and art.

The library of the State Laboratory of Natural History is rich in the world's best literature upon biological sciences, and affords advanced students excellent opportunities for work in this line.

The library of the Agricultural Experiment Station has 3,800 volumes and 2,200 pamphlets. This is also accessible to students.

LABORATORIES.

These essential facilities for modern educational work have been provided at the cost of large sums of money, and of much care to have them best suited for their various purposes. They are thoroughly well equipped.

The chemical laboratories occupy a building 75 by 120 feet, four stories high, including basement and mansard. The basement is used for storage, and for work in mining and metallurgy; the first floor has a lecture room, a laboratory for quantitative work for one hundred and fifty students, and several subsidiary rooms; the second floor, its laboratories for qualitative analysis, private work, lecture room, store room, etc.; and on the uppermost floor is the laboratory of the Agricultural Experiment Station, and apartments for photography.

Natural History Hall is occupied with the laboratories and lecture rooms for the work and instruction in botany, zoölogy, physiology, mineralogy, and geology; it also contains the office and equipments of the State Laboratory of Natural history, and of the State Entomologist, as well as the office and library of the Agricultural Experiment Station. There are six laboratory rooms on each of the main floors—sufficient altogether to accommodate two hundred students, besides offering abundant facilities for the private work of the instructors. The laboratory work in these departments constitutes a very large part of the instruction.

The psychological laboratory in Natural History Hall is well provided with apparatus of many different kinds for use in experimental study and research, and with charts and models to aid in instruction. This laboratory is a new one, but has already attracted wide attention and has awakened special interest in the science to which it is devoted.

The physical laboratory and lecture room are in University Hall, occupying large, well lighted and well arranged apartments. Still better rooms in the Engineering Hall will be occupied next year. Students have ample facilities for experimental work and opportunity to prosecute it under the guidance of the instructors.

The electrical laboratory is also in University Hall. It has five rooms, each especially adapted to its distinct purpose, and equipped for work in experiment and research. The laboratory has its own power from a steam engine.

The testing laboratory, located in Machinery Hall, gives opportunity to students of the College of Engineering to make various practical experiments and tests, and to prosecute original investigations in the lines of their specialties.

The mechanical laboratory occupies a large part of both floors of Machinery Hall, and each of its departments is equipped for practical work by students. There is a large machine shop with hand and machine tools for all the required operations; a pattern shop, a blacksmith shop, a foundry, a boiler room, etc.

The architectural workshops, in the same building with the mechanical laboratory, are fully equipped for bench and lathe work, and are supplied with all essential machine tools. Students become familiar with the tools and the work of the carpenter and cabinet maker, as well as with the draughting operations of the architect's office.

The farms, fruit and forestry plantations, and gardens offer abundant illustrations of the work associated with the courses of instruction in agriculture and horticulture. The varied and carefully conducted operations of the Agricultural Experiment Station afford excellent aids to students in these departments. For its specific purposes there are used about one hundred and seventy acres.

COLLEGE OF AGRICULTURE.

FACULTY.

THOMAS J. BURRILL, PH.D., LL.D., ACTING REGENT, Botany.
GEORGE E MORROW, A.M., *Dean*, Agriculture.
DONALD MCINTOSH, V.S., Veterinary Science.
ARTHUR W. PALMER, Sc.D., Chemistry.
ELBRIDGE R. HILLS, CAPTAIN 5TH ARTILLERY, U. S. A., Military Science.
SAMUEL W. PARR, M.S., Analytical Chemistry.
DANIEL W. SHEA, PH.D., Physics.
GEORGE W. MYERS, M.L , Mathematics.
KATHARINE MERRILL, A.B., English Language and Literature.
EDGAR J TOWNSEND, PH.M., Mathematics.
GEORGE P. CLINTON, B.S., Botany.
THOMAS A. CLARK, B.L., English.
FRANK D. GARDNER, B.S., Agriculture.
ALICE M. BARBER, M.S., Botany.
ALFRED H. WHITE, A.B., Chemistry.
BERNARD V. SWENSON, B.S., Physics.
GEORGE W. MCCLUER, M.S., Horticulture.
WILLIAM D. GIBBS, B S., Agriculture.
CLENDON V. MILLAR, B.S., Chemistry.
HARLEY E. REEVES, Military Science.

COLLEGE OF AGRICULTURE.

The College of Agriculture aims to give a liberal and practical education, based largely on the natural and physical sciences, but supplementing these with technical or professional studies in which the application of science to the best modern practice of agriculture is carefully considered. The purpose is to prepare its students to be intelligent and successful farmers or horticulturists; teachers of agriculture in schools or colleges, or through the agricultural press, or to be investigators in the agricultural experiment stations of the country. It also gives a good foundation in the study of veterinary science.

Shorter courses are provided for those who already have a good scientific education, and for those who desire to pursue the technical studies with special reference to their practical applications.

This college has the advantage of a close connection with the other colleges of the University, especially with the College of Science. The libraries, laboratories, museums, and collections of the University are a part of its equipment.

Methods of Instruction.

So far as is practicable, the professional studies are taught after a study of the sciences with which agriculture is most closely related. They are taught mainly by lectures, with use of text-books, where suitable ones are available. Readings are prescribed in standard agricultural books and periodicals. Large use is made of the publications of agricultural experiment stations. Frequent written or oral discussions of the principles taught are required of the student. Principles are also illustrated by observations in the fields, stables, orchards, gardens, etc., of the University, or in the vicinity.

The constant aim is to aid the student in forming habits of careful and accurate observation and investigation; to lead him to seek the reasons for agricultural methods, as well as to learn rules of practice; to teach him how to use the sources of knowledge concerning agriculture; and to help him to become an intelligent, progressive citizen and business man.

The Agricultural Experiment Station, with a farm of 170 acres and suitable buildings, exhibits field experiments in testing the different varieties and modes of culture of field crops, and in the comparison and treatment of soils. It carries on experiments in agriculture, horticulture, dairying,and in feeding animals of different ages and development upon the various kinds of food. In common with similar departments in the several agricultural colleges of the country, it attempts to create positive knowledge towards the development of an agricultural science. A dairy house, fitted with a cream separator, apparatus for deep and shallow setting of milk, churns, etc., is used in illustration of dairy processes.

Surveying and drainage are illustrated by field practice, with instruments, and by models. Agricultural chemistry is pursued, in connection with laboratory practice, in the analysis of soils, fertilizers, foods, etc. The College has fine collections of soils, seeds, plants, implements, models, and skeletons of domestic animals, charts, and other apparatus, including a large number of models of agricultural machinery.

Upon the grounds devoted to the use of the College are: an orchard containing numerous varieties of apples, pears, cherries, grapes, and small fruits; a forest tree plantation, embracing the most useful kinds of timber; an arboretum, in which all hardy, indigenous, and exotic trees are planted as fast as they can be secured, and which now contains nearly one hundred varieties.

The ornamental grounds which surround the University buildings contain about twenty acres, and are kept in neat and attractive style. These, with all the adjuncts of trees and flowering shrubs, lawns, beds of flowers and foliage plants, walks of different materials and styles of laying out, give illustrations to the class room work in landscape gardening. A greenhouse contains a collection of plants of great value for the classes in floriculture and landscape gardening, besides furnishing students with practice in greenhouse management.

The extensive fruit plantations of the Agricultural Experiment Station give abundant opportunity for studies and illustrations in many horticultural lines, and add greatly to the effectiveness of class room work.

The cabinet contains a series of colored casts of fruits, enlarged models of fruits and flowers, collections of seeds of native and exotic plants, of specimens of native and foreign woods, of beneficial and injurious insects, and of specimens showing their work; numerous dry and alcoholic specimens and preparations; maps, charts, diagrams, drawings, etc.

The College has a supply of compound microscopes and apparatus, and students have opportunity to learn their use and to make practical investigations with them. The herbarium is rich in specimens of useful and noxious plants, including many of the fungus parasites which cause disease to cultivated crops.

CLASSIFICATION OF STUDIES.

For the degree of Bachelor of Science in the College of Agriculture 40 full term credits are required. Of these credits, 16 must be obtained by pursuing the required studies, each for the time named below. The other 24 credits may be obtained by pursuing further required studies or by the prosecution of elective studies. Two term credits may be obtained upon special work in senior year in lines of any of the required sciences in the preparation of a thesis.

Students who have completed a four years' course of study in the College of Science may take the professional agricultural studies in one

year; and those who have followed a course for two years may take the professional studies, and other scientific or general studies, in the last two years of their course.

It should be understood that much liberty in choice of studies is permitted. Students particularly interested in animal husbandry or veterinary science may specialize in these branches and take other subjects most nearly related thereto, while those so desiring may make most prominent the horticultural subjects. Chemistry may be taken as the chief scientific subject, or with a minimum of this, the biological sciences may be selected as specialties. It will be noticed that very full courses may be chosen in any of the following: Botany, Chemistry, Economics, Geology, Physics, Zoölogy. During the first two years a course may be identical with one chosen in the College of Science. The special professional subjects occur in the third and fourth years, or may all be taken in the fourth year.

Required Studies.

Agriculture (1, 3, 4, 5), 3 credits.
Horticulture (1 or 5), 1 credit.
Veterinary (2), 1 credit.
Botany (1 or 6), 1 or 3 credits.
Chemistry (1, 3a, 4), 3 credits.
Physics (1 and 3, or 2), 1 or 3 credits.
Mathematics (1, 3), 2 credits.
English (8), 2 credits.
Military (1, 2), 2 credits.

Elective Studies.

Agriculture (2), 1 credit.
Horticulture (2, 3, 4), 2 credits.
Veterinary Science (1, 3), 4 credits.
Botany (1, 2, 3, 4, 5), 8 credits.
Chemistry (5a, 5c, 9, 13), 6 credits.
General Biology, 1 credit.
Geology (1 or 4), 1 or 3 credits.
Mineralogy (1), 1 credit.
Physiology (1, 2, 3), 5 credits.
Meteorology (1), ½ credit.
Zoölogy (1, 2, 3, 4, 5, 6, 8), 9 credits.
Anthropology (1, 2), 1 credit.
Economics (1, 2, 3, 4, 5), 5 credits.
Psychology (1), 1 credit.
Art and Design (4), 3 credits.
English (7), 3 credits.
French (5), 3 credits.
German (1 or 5, 2, 6), 6 credits.
History (—), 4 credits
Shop Practice (D), 3 credits.

Courses of Instruction by Years and Terms.

The following list shows the terms of the year when the various subjects are taught, and the order in years in which they should be pursued. The figures at the left refer to the terms or divisions of the year; those following the names of subjects indicate the special part or parts of these subjects to be taken, of which a full description may be found in the latter part of this book, or by means of the index.

FIRST YEAR.

1. Mathematics 1; Art and Design 4; Chemistry 1; English 7; French 5; Military 1, 2.
2. Art and Design 4; Chemistry 3a; English 7; French 5; Military 1, 2; Mathematics 3, Zoölogy 1, 2, 3, or 8.
3. Art and Design 4; Botany 6; Chemistry 3b, 4; English 7; French 5; Military 2; Zoölogy 1, 2.

SECOND YEAR.

1. Botany 1; Chemistry 5a; German 1 or 5; Military 2; Mineralogy 1; Physics 1 and 3, or 2; Physiology 4; Zoölogy 1, 3.
2. Botany 1; Chemistry 7, 9, 13; Geology 1a, 4; German 1 or 5; Military 2; Physics 1 and 3, or 2; Physiology 1; Zoölogy 4 (Entomology).
3. Botany 1 (Vegetable Physiology) or 6; Chemistry 5c, 7, 9, 13; Geology 1b; German 1. or 5; Military 2; Physics 1 and 3, or 2; Physiology 1; Zoölogy 4 (Entomology).

THIRD YEAR.

1. Anthropology 2; Botany 2 (Bacteriology); Economics 1; Geology 1c; German 2; History —; Meteorology 1; Philosophy 1; Physiology 2; Psychology 1; English 8; Zoölogy 6.
2. Botany 3; Economics 2; German 6; History —; Physiology 2; English 8; Zoölogy 5, 6.
3. Botany 4; Economics 5; General Biology 4, German 6; History —; Physiology 2; English 8; Zoölogy 6.

FOURTH YEAR.

1. Agriculture 1; History —; Horticulture 1; Thesis —; Veterinary Science 1, 4.
2. Agriculture 2, 3; Economics 3; Horticulture 2, 3, 5; Thesis —; Veterinary Science 2, 4.
3. Agriculture 4, 5; Economics 3, 4; Horticulture 4; Thesis —; Veterinary Science 2, 4.

JUNIOR COURSE IN AGRICULTURE.

A two years' course has been arranged for those who desire some knowledge of the physical and natural sciences, as well as the professional

agricultural studies. For admission to this course students should not be less than eighteen years of age, and if under twenty-one years must pass the examinations in the common branches as required for entrance to the Preparatory School. The studies of the first year, except chemistry, and also the botany of the second year will be taken in the Preparatory School.

Students of sufficient age and attainments may take the professional studies of this course in one year. Horticultural studies may be substituted for veterinary science if desired.

The two years' course is arranged as follows:

Junior Course in Agriculture.

FIRST YEAR.

1. Chemistry; Physiology; Accounts; English.
2. Chemistry; Physics; Zoölogy; English.
3. Chemistry; Physics; Botany; English.

SECOND YEAR.

1. Farm Equipment; Animal Anatomy; Botany; Economics.
2. Rural Economy; Veterinary Science; Animal Husbandry, Entomology or Horticulture.
3. History of Agriculture; Rural Law; Veterinary Science; Entomology; Special Investigations.

Free Short Course.

For the winter term students are admitted without entrance examination or payment of any fee to a special short course in which there are daily lectures and class exercises concerning some of the most important practical branches of agriculture, horticulture, and veterinary science. This course is designed for young men already engaged in agricultural pursuits who cannot spend a long time in college, and yet are anxious to make the most of themselves and of their vocation. Such students have access to the library and museum collections of the University, and have admission to the courses of general lectures.

The details of this course vary from year to year. A special circular giving full information concerning it will be issued each year several weeks before the opening of the term the first of January.

COLLEGE OF ENGINEERING.

FACULTY.

Thomas J. Burrill, Ph.D., LL.D., Acting Regent, Botany.
Samuel W, Shattuck, C.E., Mathematics.
N. Clifford Ricker, M.Arch., *Dean*, Architecture.
Ira O. Baker, C.E., Civil Engineering.
Arthur N. Talbot, C.E., Municipal and Sanitary Engineering.
Arthur W. Palmer, Sc.D., Chemistry.
Frank F. Frederick, Art and Design.
Elbridge R. Hills, Captain 5th Artillery, U. S. A , Military Science.
Samuel W. Parr, M.S., Analytical Chemistry.
Lester P. Breckenridge, Ph.B., Mechanical Engineering.
Daniel W. Shea, Ph.D., Physics.
George W. Myers, M.L., Secretary, Mathematics.
Katharine Merrill, A.B., English.
James M. White, B.S., Architecture.
Edgar J Townsend, Ph.M., Mathematics.
William H. VanDervoort, M.S., Mechanical Engineering.
William D. Pence, B.S., Civil Engineering.
George W. Parker, Wood Work.
Edith A Shattuck, Drawing.
Thomas A. Clark, B.L., English.
Cyrus D. McLane, B.S., General Engineering Drawing.
Cyril B. Clark, Machine Shops.
Hervey E. Parker, Architectural Shops.
James D. Phillips, B S., General Engineering Drawing.
Charles A Gunn, B.S., Architecture.
William Esty, A.M., Electrical Engineering.
Bernard V. Swenson, B.S , Physics.
Albert R. Curtiss, Machine Shops.
Lorin W. Peabody, B.S., Testing Laboratory.
Henry Jones, Blacksmith Shop.
Harley E. Reeves, Military Science.

COLLEGE OF ENGINEERING.

The purpose of the College of Engineering is thoroughly to educate and prepare engineers and architects for their future professional courses. Its aim must therefore be twofold—general and technical. A considerable proportion of the course of study must be devoted to general and literary work, since a graduate is expected now to arrange his ideas in clear order, and to write or speak effectively, whenever it becomes necessary. Professional success frequently depends upon this power far more than is commonly supposed.

Moreover there is an ever-increasing fund of general and scientific knowledge with which any educated man is expected to be conversant, if he desires to retain the esteem of his associates and clients. Much of the most valuable material is yet locked up in foreign languages, and their keys must be acquired by patient study and practice. Scarcely a single science is not at some time useful to the professional man, and some of them, like mathematics or physics, are so intimately interwoven with the different branches of technical knowledge, as to be practically indispensable, and so require a more thorough mastery than is necessary to the literary man. It might appear that this general training would alone be sufficient to absorb the entire attention of the student during his whole course, but not less than one-half his time must be given to purely technical training, and the acquiring of a professional capital, or stock of information and knowledge of details, which is almost limitless in its demands and possibilities.

The methods employed for embodying new ideas in drawings, intelligible to other professional men and to mechanics, must likewise be acquired.

A knowledge of the latest results of scientific experiments is likewise essential, requiring wide reading by some one, either student or professor. Engineering knowledge must be fresh to be valuable, since ideas and methods are quickly supplanted by improved ones, and become useless except as mile-stones of progress. Consequently the most valuable part of this professional knowledge can never be crystalized in text-books, but must be drawn from the mental stores of the teacher.

General Methods of Instruction.

Whenever suitable text-books can be found they are employed, because saving much time in acquiring facts and data, and because such books become doubly valuable for later reference when enriched by notes and additions. But to arouse and awaken the enthusiasm of the

student, occasional or stated lectures are necessary, and these are fully illustrated by sketches, diagrams, drawings, and photographs of executed work. They are frequently used in the advanced classes, partly because the deficiency of text-books is there most apparent. Additional courses of extended reading are marked out by references to the University library, so that each student may enjoy the greatest possible benefit from the course of instruction. In all courses of study offered by the College, drawing in its manifold forms and uses is made of especial importance both in its use and and its modes of execution.

Laboratory of Applied Mechanics.

The laboratory has an Olsen testing machine of 200,000 and a Riehle testing machine of 100,000 pounds capacity, a smaller apparatus for testing beams, Riehle and Olsen cement testing machines, a Riehle wire testing machine, extensometers and deflectometers, a stone grinding machine, a rattler for abrasion tests of stone and brick, with other apparatus for making all necessary measurements and observations, molds, standard sieves for cement, etc. The laboratory is fitted up as a working laboratory where students may acquire such practice in experimental work as engineers are called upon to perform, as well for the purpose of illustrating principles as for use in original investigation. The ordinary work includes testing metals, wooden beams, cement briquettes, and stone and brick.

The hydraulic laboratory includes elevated tank and stand-pipe, steam pumps for giving high pressure, tanks for measuring flow of water, pressure gauges, meters, water motor, turbine, and other apparatus for experiments with orifices, weirs, etc. The experiments are made in connection with the regular class instruction.

Computing Apparatus.

A collection of machines and apparatus for abbreviating computations and especially for use in the calculation of tables, includes the following instruments:

A Thomas's 10-place arithmometer, giving products of numbers to 20 places. This is the largest size manufactured and was imported especially for the University. It is probably as convenient and accurate as any computing machine yet invented. It performs addition, subtraction multiplication, and division, and is particularly useful in calculating or verifying numerical tables. Two Thacher's computing scales, for performing multiplication, division, squaring, and extraction of square root.

This instrument is sufficiently accurate for almost all purposes, and can be used more rapidly than the former. An Amsler's polar planimeter for measuring the area of figures of any form, and principally employed in graphic statics, or by mechanical engineers for measuring indicator diagrams.

A Coradi's rolling planimeter of largest size, and a Coradi's polar planimeter, for the same purposes, but much more accurate in use. An Amsler's integrator for obtaining area, static moment and moment of inertia of plane figures, especially of sections of columns, beams, etc. A Coradi's pantagraph of best construction for reduction of drawings and maps. Boucher's calculator, Ram's slide rules, duplex slide rule, Webb's adders, etc.

DESCRIPTION OF DEPARTMENTS.

Physics.

The courses in Physics are designed to furnish a thorough scientific training for those students who intend to devote their lives to the profession of engineering, scientific research, or teaching.

INSTRUCTION.

The instruction is given by means of lectures and by practice in the laboratory. The work in the laboratory consists almost entirely of quantitative measurements made under the personal supervision of the instructors, with instruments of precision. An effort is made to have each student determine for himself the relations existing between the facts which he has observed, in order to stimulate him to the formation of habits of sound thinking. The instruction in the advanced courses is mainly by lectures and by seminary work. Ample opportunity for advanced laboratory work will be given those who desire it.

EQUIPMENT.

The department of physics has for its quarters a large lecture room provided with conveniences for lecture illustrations, such as projecting lantern, switch board, resistances, motors, etc.; also a laboratory for experimental work, a photometry room, and a photographic dark room. This department will have quarters next year in Engineering Hall.

The equipment consists of a line of apparatus selected from the best makers with special reference to lecture illustrations and quantitative

laboratory work. Large additions have lately been made to the apparatus in this department. The equipment of the electrical laboratory adds greatly to the facilities for the treatment of electricity in general physics.

Mechanical Engineering.

It is the object of this course to give the student a thorough training in the theoretical principles underlying the science of machines and mechanics, and at the same time to enable him to become practically familiar with some of the numerous applications of these principles which have become of such inestimable value to the human race.

INSTRUCTION.

The methods of instruction vary with the subjects under consideration. Text-books, lectures, examples, drawing room work, technical readings, models, reports, laboratory and shop practice—all have important places.

It is the aim to keep the student interested in his work, with the belief that it is only under such a condition that he will receive the maximum benefit from his work.

A practical course in drawing and designing extends through the entire course.

Shop or laboratory practice is also a part of each term's work.

EQUIPMENT.

In addition to recitation and drawing room facilities, which will be unexcelled upon the completion of the new Engineering Hall, the department has a Mechanical Engineering Laboratory, described under the head "Laboratories," as well as a machine shop, wood shop, forge shop, and foundry, whose equipment is described below.

Machine Shop.—Twelve engine lathes of from twelve to twenty inches swing; two ten-inch speed lathes; one centering lathe; one fifteen-inch Gould and Eberhardt shaper; one twelve-inch Hendy shaper; one Brainard universal milling machine; one milling machine, made in the shop; one twenty-four by twenty-inch by five foot Putnam planer; one thirty by thirty-inch by eight foot Gray planer; two drill presses; one sensitive drill press; one three-spindle drill press; one No. 2 improved Brown and Sharpe universal grinding machine; one center grinding machine; one Stover power hack saw; complete sets of U. S. standard

taps and dies; drills, arbors, reamers, gear and milling cutters, caliper gauges, calipers, scales, and other small tools.

Wood Shop.—Eight ten-inch wood lathes; one eighteen-inch pattern maker's lathe; one No. 4 E. Fox trimmer; complete equipment of small tools.

Twenty new work benches now under construction will be ready for use by the opening of the fall term, 1894. These benches will be complete with tail screws and Wyman & Gordon patent vises.

Foundry.—The foundry is equipped with a small cupola, the necessary sand, ladles, and flasks for making castings.

Forge Shop.—The forge shop contains sixteen forges fitted with power blast, exhaust fan, and the necessary small tools.

Power is furnished to the shops by an 8x10 Ball engine running at 275 R. P. M. Six boilers used for heating purposes, as well as engines and pumps used by other departments, furnish the students of this department additional opportunities for observation and testing.

Course in Mechanical Engineering.

FIRST YEAR.

1. Advanced Algebra; Elements of Draughting; French, German or English; Shop Practice A; Military.
2. Trigonometry; Descriptive Geometry and Lettering; French, German or English; Shop Practice A; Military.
3. Analytical Geometry; Advanced Descriptive Geometry; French, German or English; Shop Practice A; Military.

SECOND YEAR.

1. Differential Calculus; Elements of Machine Design; Shop Practice B; Physics 1 and 3; Rhetoric and Themes (English 8); Military.
2. Advanced Analytical Geometry; Elements of Machine Design; Shop Practice B; Physics 1 and 3; Rhetoric and Themes (English 8); Military.
3. Integral Calculus; Elements of Machine Design; Shop Practice B; Physics 1 and 3; Rhetoric and Themes (English 8); Military.

THIRD YEAR.

1. Analytical Mechanics; Mechanism; Shop Practice C; Chemistry.
2. Resistance of Materials; Steam Engines and Boilers; Shop Practice C; Chemistry.
3. Hydraulics; Dynamo Electric Machines; Surveying; Mechanical Laboratory.

FOURTH YEAR.

1. Thermo-Dynamics; Steam Engine Design; Mechanical Laboratory; Thesis.
2. Mechanics of Machinery; Advanced Machine Design; Mechanical Laboratory; Thesis.
3. Mechanics of Machinery; Original Designs; Estimates; Thesis.

Electrical Engineering.

This course is intended to give to young men the best possible preparation for work in the practical applications of electricity. The instruction is given by lecture, laboratory practice, designing, and draughting. The student is encouraged to add to his general intellectual culture by systematic reading of the best periodical literature in theoretical and applied electricity. By keeping himself informed about the best efforts of others in every department of his profession, it is hoped that he may be stimulated to independent thought and original investigation in his own field. To this end, a department reading room, at all times accessible to students in this course, has been recently established, where the leading American, English, French and German journals of general physics and applied electricity are kept on file. The instructors and students meet weekly to discuss the leading articles in current numbers of these journals. A critical discussion of one or more papers is required of each senior twice a month.

This department has quarters, at present, in the basement of University Hall. Next year all the work of the department, excepting that of the dynamo laboratory, will be carried on in the new Engineering Hall. The rooms devoted to laboratory practice are the electrical measurement laboratory, the dynamo laboratory, the battery room, the photometry room, and the work shop.

The electrical measurements laboratory has masonry piers for the more sensitive instruments, and numerous conveniences indispensable to rapid and accurate measurements. In this laboratory the work relating to the measurement of current, resistance, electromotive force, the

standardizing of measuring apparatus, etc., is carried on. This laboratory has been supplied with apparatus from the leading makers at home and abroad. There are several forms of bridges, resistance boxes, testing sets, non-inductive and continuously variable rheostats, and certified standards of resistance; the leading forms of galvanometers and reading devices; single and subdivided condensers, standard cells and electrostatic voltmeters; hot wire instruments; electrodynamometers; current balances; watt-meters; ammeters and voltmeters for direct and alternating currents. Current is brought to this laboratory from the battery room and from the dynamo laboratory.

The dynamo laboratory is supplied with power from a sixty-horse-power steam engine, which is used exclusively for the experimental work of this department. In this laboratory are to be found the leading types of direct and alternating current dynamos and motors, with conveniences for making complete tests. The equipment includes a complete Thomson-Houston 300-light alternating current lighting plant, a complete Thomson-Houston 3-light arc lighting plant, a complete Brush 10-light arc lighting plant, a complete Edison 100-light incandescent plant, a small 500-volt direct current power plant, and a small single phase alternating current power plant.

The photometry room is fitted out with a complete electric light photometer, numerous types of direct and alternating current incandescent and arc lamps, and conveniences necessary for making complete tests.

The battery room contains a large collection of primary cells, and several large batteries of the more important kinds of accumulators with arrangements for efficiency tests.

The work shop is supplied with an engine, a speed lathe, grinder, etc., and a line of fine tools suited to the manufacture of special apparatus. An electric motor furnishes power for this room. Large additions to the equipment of this department are now making.

Course in Electrical Engineering.

FIRST YEAR.

1. Advanced Algebra; Elements of Draughting; French, German, or English; Shop Practice A; Military.
2. Trigonometry; Descriptive Geometry and Lettering; French, German, or English; Shop Practice A; Military.
3. Analytical Geometry; Advanced Descriptive Geometry; Free Hand Drawing; Shop Practice A; Military.

SECOND YEAR.

1. Differential Calculus; Elements of Machine Design; Shop Practice B; Physics 1 and 3; Rhetoric and Themes (English 8); Military.
2. Advanced Analytical Geometry; Elements of Machine Design; Shop Practice B; Physics 1 and 3; Rhetoric and Themes (English 8); Military.
3. Integral Calculus; Elements of Machine Design; Shop Practice B; Physics 1 and 3; Rhetoric and Themes (English 8); Military.

THIRD YEAR.

1. Analytical Mechanics; Mechanism; Chemistry; Electrical Measurements.
2. Resistance of Materials; Engines and Boilers; Chemistry; Electrical Measurements.
3. Hydraulics; Chemistry or Surveying; Engineering Laboratory; Electro-Magnetism; Dynamo Electric Machinery.

FOURTH YEAR.

1. Thermodynamics; Steam Engine Design and Valve Gears; Dynamo-Electric Machinery; Thesis; Seminary.
2. Alternating Currents and Alternating Current Machinery; Photometry; Telephony; Telegraphy and Electric Signaling; Electro-Metallurgy; Thesis; Seminary.
3. Alternating Currents and Alternating Current Machinery; Lighting Plants; Electrical Transmission of Power; Thesis; Seminary.

Civil Engineering.

The design is to furnish a course of theoretical instruction, accompanied and illustrated by a large amount of practice, which will enable the student to enter intelligently upon the various and important duties of the civil engineer.

INSTRUCTION.

While the instruction aims to be practical by giving the student information and practice directly applicable in his future professional work, the prime object is the development of the mental faculties. The

power to acquire information and the ability to use it, is held to be of far greater value than any amount of so called practical acquirements. The method of instruction consists in coupling the development of intellectual power with the acquisition of information directly useful to the civil engineer in his profession.

The instruction is given by lectures, text books, and reading, to which are added numerous problems and practical exercises, as will serve best to explain principles completely and fix them in the mind. Models and instruments are continually used, both in lectures and by the students.

COURSE OF STUDY.

The complete course occupies four years. The several subjects included therein are shown in the list below. Each study requires five recitations per week, and should receive daily from three to four hours of the student's time. Some of the class exercises occupy one hour daily, while others require two hours; as a rule the latter require less time for preparation. The order of studies as given by the year and term in the tabular view of the course, should be closely followed to avoid interference in hours of recitation, and because the studies are there given in the order which best meets the preparation of the student.

Course in Civil Engineering.

FIRST YEAR.

1. Advanced Algebra; Elements of Draughting; Shop Practice A; French, German, or English; Military.
2. Trigonometry; Descriptive Geometry and Lettering; Shop Practice A; French, German, or English; Military.
3. Analytical Geometry; Advanced Descriptive Geometry; Shop Practice A; French, German, or English; Military.

SECOND YEAR.

1. Differential Calculus; Land Surveying; Physics 1 and 3; Rhetoric and Themes (English 8); Military.
2. Advanced Analytical Geometry; Topographical Drawing and Transit Surveying and Leveling; Physics 1 and 3; Rhetoric and Themes (English 8); Military.
3. Integral Calculus; Topographical Surveying; Physics 1 and 3; Rhetoric and Themes (English 8); Military.

THIRD YEAR.

1. Analytical Mechanics; Railroad Engineering; Chemistry.
2. Resistance of Materials; Railroad and Road Engineering; Engineering Materials.
3. Hydraulics; Astronomy; Roofs.

FOURTH YEAR.

1. Masonry Construction; Geodesy and Practical Astronomy; Water Supply Engineering; Thesis.
2. Bridge Analysis; Sewerage; Structural Details; Thesis.
3. Bridge Designing; Tunneling; Geology; Thesis.

Municipal and Sanitary Engineering.

This course is a modification of the civil engineering course, and is designed for students intending to make a specialty of city engineering work. It includes the study of chemistry and bacteriology, necessary to a comprehension of the questions involved in water supply and sewage disposal.

Course in Municipal and Sanitary Engineering.

FIRST YEAR.

1. Advanced Algebra; Elements of Draughting; Shop Practice A; French, German, or English; Military.
2. Trigonometry; Descriptive Geometry and Lettering; Shop Practice A; French, German, or English; Military.
3. Analytical Geometry; Advanced Descriptive Geometry; Shop Practice A; French, German, or English; Military.

SECOND YEAR.

1. Differential Calculus; Land Surveying; Physics 1 and 3; Rhetoric and Themes (English 8); Military.
2. Advanced Analytical Geometry; Topographical Drawing, and Transit Surveying and Leveling; Physics 1 and 3; Rhetoric and Themes (English 8); Military.
3. Integral Calculus; Topographical Surveying; Physics 1 and 3; Rhetoric and Themes (English 8); Military.

THIRD YEAR.

1. Railroad Engineering; Analytical Mechanics; Chemistry.
2. Railroad and Road Engineering; Resistance of Materials; Botany.
3. Roofs; Hydraulics; Electrical Measurements.

FOURTH YEAR.

1. Water Supply Engineering; Masonry Construction; Bacteriology; Thesis.
2. Sewerage; Bridge Analysis; Chemistry; Thesis.
3. Tunneling; Bridge Designing; Chemistry; Thesis.

Architecture.

The object of this course of study is to prepare graduates for the profession of architecture, as architects, draughtsmen, and superintendents of construction. A thorough knowledge of scientific principles applied to construction, and of drawing in its various developments, a practical acquaintance with the methods and processes of the various building trades, as well as a considerable degree of skill in the use of tools, are all essential to the fulfillment of this purpose, and are therefore made prominent in the course of instruction.

METHODS OF INSTRUCTION.

The principal lines of technical study take up the theory and practice of construction, the history and esthetics of architecture, architectural drawing as now practiced in offices, as well as the various modes of finishing drawings, the use of the architectural orders, and the usual routine and methods of office practice, so far as this can be successfully taught in a professional school.

This instruction is imparted by the study of text books, with recitations and the solution of numerous special problems, also by lectures, as well as by the use of syllabuses instead of text books, where suitable works do not yet exist. Engravings, photographs, models and sketches are employed as illustrations.

Drawing is practiced during the entire course, and whenever possible, the student is required or encouraged to produce original designs. Opportunity is also afforded for two years' instruction in free hand drawing, modeling, water colors, designing, and sketching from nature.

Shop practice commences with the production of true plane surfaces in wood, and extends through joinery, cabinet work, turning, and veneering, to the making of models of architectural constructions to scale from drawings.

APPARATUS.

A collection of casts donated by the Spanish government, and another of casts of various architectural details from Lehr, of Berlin, belong to the departments of architecture and of design; models of ceilings, roof trusses, stairs and Schroeder's models of joints in wood work and of construction in cut stone work, in the engineering museum.

A collection of Japanese, Norwegian, and Indian work in industrial art from the Columbian Fair.

The department of architecture also possesses a large and rapidly increasing collection of engravings and photographs illustrating the history of architecture and art, and their practical applications in all ages. The collection is mounted on about 12,000 cards, 11x14 inches, and is classified in two parts, one for the use of the class in history of architecture, the other for use by the various classes in designing; both series are minutely subdivided to facilitate easy reference, and are always open for free use, thus forming a most valuable working library. The plates issued by the most important American architectural journals are to be found here. This collection is placed in one of the architectural drawing rooms. An electric arc lantern of best make for use in illustrating lectures, and 700 lantern slides of the most important architectural monuments of all historical styles.

The casts, photographs, etc., of the art gallery. In the University Library are many of the best English, German, French, and American architectural works and periodicals.

Apparatus for experimental work in heating and ventilation.

A large and well equipped carpenter and cabinet shop containing cabinet benches and sets of fine tools for classes in shop practice; foot and power lathes; machine saws, planers, molder, tenoner, shaper, jig saw, mortiser, boring machine, etc.

An architect's level, rod, and 100-foot steel tape.

A 5x7 folding kodak of latest pattern, fitted with roll holder, plate holders, and film carriers. An 8x10 camera, with a Steinheil aplanatic, wide angle lens, for copying architectural views and interiors.

Architectural Course.

FIRST YEAR.

1. Advanced Algebra, Elements of Draughting; Shop Practice D; French, German, or English; Military.
2. Trigonometry; Descriptive Geometry and Lettering; Shop Practice D; French, German, or English; Military.
3. Analytic Geometry; Advanced Descriptive Geometry; Shop Practice D; French, German, or English; Military.

SECOND YEAR.

1. Differential Calculus; Wood Construction; Physics 1 and 3; Military; Rhetoric and Themes (English 8).
2. Advanced Analytical Geometry; Stone, Brick, and Metal Construction; Physics 1 and 3; Military; Rhetoric and Themes (English 8).
3. Integral Calculus; Sanitary Construction; Physics 1 and 3; Military; Rhetoric and Themes (English 8).

THIRD YEAR.

1. Analytical Mechanics; Architectural Drawing (The Orders); Chemistry; Architectural Seminary.
2. Resistance of Materials; History of Architecture; Architectural Drawing; Architectural Seminary.
3. Roofs; History of Architecture; Surveying; Architectural Seminary.

FOURTH YEAR.

1. Superintendence, Estimates, and Specifications; Heating and Ventilation; Free Hand Drawing, or Modeling
2. Architectural Perspective; Architectural Design; Free Hand Drawing, or Water Colors; Thesis.
3. Esthetics of Architecture; Architectural Design; Free Hand Drawing, or Sketching; Thesis.

Architectural Engineering.

The especial purpose of this course of study is to qualify graduates for the profession of architecture, and particularly as architects, structural draughtsmen, and computers, as well as superintendents of construction. It is intended for those students preferring the mathematical and structural side of architecture to its artistic side, and for those who wish to acquire a thorough knowledge of iron and steel construction as it is now executed in architectural structures.

The course of study differs from that in architecture in the following particulars: Hydraulics is required. Masonry construction, bridge analysis, and bridge designing, as taught to civil engineers, are taken instead of the year of work in free hand drawing. The orders and history of architecture (details) are omitted. A term of work in advanced graphics is also offered in lieu of architectural perspective. The remainder of the course of study is identical with that in architecture. The methods of imparting instruction are also similar, and are fully described elsewhere.

Architectural Engineering Course.

FIRST YEAR.

1. Advanced Algebra; Elements of Draughting; Shop Practice D; French, German, or English; Military.
2. Trigonometry; Descriptive Geometry and Lettering; Shop Practice D; French, German, or English; Military.
3. Analytical Geometry; Advanced Descriptive Geometry; Shop Practice D; French, German, or English; Military.

SECOND YEAR.

1. Differential Calculus; Wood Construction; Physics 1 and 3; Military; Rhetoric and Themes (English 8).
2. Advanced Analytical Geometry; Stone, Brick, and Metal Construction; Physics 1 and 3; Military; Rhetoric and Themes (English 8).
3. Integral Calculus; Sanitary Construction; Physics 1 and 3; Military; Rhetoric and Themes (English 8).

THIRD YEAR.

1. Analytical Mechanics; Architectural Drawing; Chemistry; Architectural Seminary.
2. Resistance of Materials; History of Architecture, Architectural Drawing; Architectural Seminary.
3. Roofs; History of Architecture, Hydraulics; Architectural Seminary.

FOURTH YEAR.

1. Masonry Construction; Superintendence, Estimates, and Specifications; Heating and Ventilation.
2. Bridge Analysis; Architectural Perspective, or Advanced Graphics; Architectural Design; Thesis.
3. Bridge Design; Surveying; Architectural Design; Thesis.

COLLEGE OF SCIENCE.

FACULTY.

THOMAS J. BURRILL, PH.D., LL.D., ACTING REGENT, Botany.
SAMUEL W. SHATTUCK, C.E., Mathematics.
EDWARD SNYDER, A.M., German.
STEPHEN A. FORBES, PH.D., *Dean*, Zoölogy.
CHARLES W. ROLFE, M.S., Geology.
ARTHUR W. PALMER, SC.D., Chemistry.
FRANK F. FREDERICK, Art and Design.
ELBRIDGE R. HILLS, CAPTAIN 5TH ARTILLERY, U. S. A., Military Science.
SAMUEL W. PARR, M.S., Analytical Chemistry.
FRANK M. MCMURRY, PH D., Pedagogics.
DANIEL W. SHEA, A.M., Physics.
DAVID KINLEY, PH.D., Political Economy and Social Science.
GEORGE W. MYERS, M.L., Mathematics.
KATHARINE MERRILL, A B, English Language and Literature.
WILLIAM O. KROHN, PH.D., Psychology.
ELIZABETH C. COOLEY, A.B., German Language and Literature.
HENRY E. SUMMERS, B.S., Human Physiology and Vertebrate Anatomy.
EDGAR J TOWNSEND, PH.M., Mathematics.
ARTHUR H. DANIELS, PH.D., Philosophy.
EDITH A. SHATTUCK, Drawing.
GEORGE P. CLINTON, B.S., Botany.
THOMAS A. CLARK, B.L., English.
WILLIAM E SANDFORD, PH.C., *Secretary*, Pharmacy.
ALICE M. BARBER, M.S., Botany.
HERMAN S PIATT, A B., French.
ALFRED H. WHITE, A.B, Chemistry.
BERNARD V. SWENSON, B.S., Physics.
FRANK SMITH, A.M., Zoölogy.
CLENDON V. MILLAR, B.S, Chemistry.
CHARLES W. CARTER, B.L., German.
HARLEY E. REEVES, Military Science.

COLLEGE OF SCIENCE.

The College of Science affords an opportunity for the study of the natural, physical and mathematical sciences, and of the philosophical subjects, either as specialties or as the substance of a liberal education. The candidate for graduation may take a year each in any four of the principal subjects of this college, with a considerable amount of language, literature, and general study; he may concentrate his major work on any one of the several subjects in which major courses are offered—taking, for example, four years in the chemical courses, three years in botany or zoölogy, or two years in physiology, geology, psychology, pedagogics, economics, or philosophy; or he may adopt any program of concentration of his major work intermediate between these extremes.

The subjects presented in this College are acordingly arranged in four groups—natural science, chemical, mathematical, and philosophical—each characterized by the predominant importance and development of the subjects indicated by its name. The studies of each group are again divided into required and elective subjects, and the latter are further subdivided into three lists, A, B, and C. All those of the required list are necessary to graduation in the group of studies specified; those of the elective lists A and B are open to election, restricted only by certain general requirements, varying in the different groups, regarding the amount and distribution of the work to be done on them; and those of list C are open to election unconditionally.

It is the purpose of this system of classification and requirements to permit large liberty of choice with respect both to main lines of study and to associated or secondary subjects, and at the same time so to guide the student's elections that his course of study shall always contain a central core or axis of closely articulated major work. Preference is further given to those minor subjects most important because of their relations to the major work elected.

The only undergraduate degree given in this College is that of Bachelor of Science. Forty* full term credits for University studies are required for graduation, two of which must be earned by investigation work, the results of which are to be presented in the final thesis. Credit will be given for fractions of courses of instructions only in exceptional cases, by vote of the College faculty.

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*Forty-one in the chemical group.

THE NATURAL SCIENCE GROUP.

The courses of the natural science group are especially intended to afford a general preparation for professional and business pursuits requiring more of an acquaintance with the methods and facts of science than with those of literature. More specifically they are designed:

(1.) To afford a thorough liberal education with a basis in science and the modern languages.

(2.) To prepare for the pursuit of specialties in zoölogy, entomology, physiology, botany, or geology, as a scientific career.

(3.) To lay a liberal foundation in biological work and study for a course in medicine.

(4.) To prepare for the teaching of the natural and physical sciences either in the higher schools or as a professional specialty.

The recent establishment, by the University, of a biological station for a continuous investigation of the aquatic life of the Illinois River and adjacent waters, affords an extraordinary opportunity for advanced students in the zoölogical and botanical courses. Provision will be made for postgraduate investigation at this station by students working for advanced degrees.

Classification of Subjects.

required.

German (1, 2), 5 credits.
Mathematics (1, 3), 2 credits.
Art and Design (4), 2 credits.
Rhetoric and Themes (English 8), 2 credits.
Chemistry (1, 3a, 3b, or 4), 3 credits.
Military Science (1, 2), 2 credits.

electives.

*List A** (Major Courses).	*List B** (Minor Courses).
Botany (1 to 5), 3, 4, 6, or 9 credits.	Botany (6), 1 credit.
Zoölogy (1, †2, ‡3), †2, ‡3, 6, 8, or 9 credits,	Zoölogy (8), 1 credit.
General Biology, 1 credit.	Physiology (4), 1 credit.
Mineralogy (1, 2), 1 or 3 credits.	Geology (4), 1 credit.
Geology (1, 2), 3 or 5 credits.	Physics (2), 1 credit.
Physics (1, 3), 3 credits.	
Physiology (1, 2, 3), 2, 5 or 7 credits.	

*No number of credits in any subject will be accepted as major work, other than the numbers specified against that subject in list A. Credit will not be given for both major and minor work in the same subject.

†Credited as major work only when followed by zoölogy 4.

‡Credited as major work only when followed by physiology 1.

List C (Miscellaneous).

French (1, 2, 4), 3 or 6 credits.
English (1), 3 credits.
German (6), 1 credit.
Greek (9), ½ credit.
History (1), 3 credits.
Anthropology (2), ½ credit.
Chemistry (5, 7, 9), 3 credits.
Materia Medica, 3 credits.
Descriptive Astronomy (4), 1 credit.
Meteorology (1), ½ credit.
Mathematics (5 or 6), 1 credit.
Psychology (1 to 8), 1 to 9 credits.
Pedagogy (1 to 8), 2 to 10 credits.
Economics (1 to 8), 1 to 8 credits.
Philosophy (1 to 8), 1 to 7 credits.

The major and minor courses in the lists A and B in this group are respectively the maximum offerings and the minimum requirements in the various subjects of these lists.

Requirements for Graduation.

No student may graduate in natural science until he has completed all the required courses of the first list, has done at least nine terms' work on one major subject, or twelve terms work on more than one major, from lists A and B of electives, has taken at least minor courses in all the other subjects of these lists in which such courses are offered, and has prepared and handed in a thesis acceptable to the faculty of the College and of the University. The necessary number of forty full term credits for University studies may be made up by additional elections from the three lists of electives.

Courses of Instruction by Years and Terms.

The courses mentioned in the following list may be taken in the indicated term only. Those whose names are italicized, if taken at all, must be taken also in the designated year, and all the others should be so taken if practicable.

FIRST YEAR.

1. *Mathematics* 1, 2; *Chemistry* 1; *Art and Design* 4; French 1, 4; *Military* 1, 2.
2. *Chemistry* 3a; French 1, 4; *Military* 1, 2; *Mathematics* 3, 4; Zoölogy 1, 2, 3, 8.
3. Mathematics 5, 6; Astronomy 4; Botany 6; *Chemistry* 3b, 4; *Art and Design* 4; French 1, 4; *Military* 2, 3; Zoölogy 1, 2.

SECOND YEAR.

1. Botany 1; Chemistry 5a; *German* 1, 4; *Military* 2, 3; Mineralogy 1; Physics 1, 3; Physiology 4; Zoölogy 1, 3.
2. Botany 1; Chemistry 5b, 7, 9; Geology 1a; *German* 1, 4; *Military* 2, 3; Mineralogy 2; Physics 1, 3, 2; Physiology 1; Zoölogy 4.
3. Botany 1 (Vegetable Physiology) 6; Chemistry 5c, 7, 9; Geology 1b; *German* 1, 4; *Military* 2, 3; Mineralogy 2; Physics 1, 3; Physiology 1; Zoölogy 4.

THIRD YEAR.

1. Botany 2 (Bacteriology); Economics 1; Geology 1c; *German* 2; History 1; Meteorology 1; Mineralogy 1; Pedagogy 1, 2, 3; Philosophy 1, 2, 8; Physiology 2; Psychology 4; *Rhetoric and Themes* (English 8); Zoölogy 6.
2. Botany 3 (Systematic); Economics 2; Geology 1a, 4; *German;* History 1, 4; Pedagogy 1, 2, 3; Philosophy 3, 4; Physiology 2; Psychology 2; *Rhetoric and Themes* (English 8); Zoölogy 5; (Embryology) 6; Mineralogy 2.
3. Botany 4; Economics 7; General Biology; Geology 1b, 3; *German;* History 1; Mineralogy 2; Pedagogy 2, 3; Philosophy 3, 5; Physiology 2; Psychology 2; *Rhetoric and Themes* (English 8); Zoölogy 3 (Embryology) 6.

FOURTH YEAR.

1. Anthropology 2; Economics 1, 3, 5; Geology 1c; History 2; Pedagogy 1, 2, 3, 7, 8; Philosophy 1, 2, 7, 8; Psychology 1, 4, 7.
2. *Botany* 5 (Thesis); History 3; Economics 2, 3, 5; *Geology* 2 (Thesis); Pedagogy 1, 2, 3, 7, 8; Philosophy 3, 6, 7, 8; *Physiology* 3 (Thesis); Psychology 2, 3, 6, 7; *Zoölogy* 7 (Thesis).
3. *Botany* 5 (Thesis); Economics 4, 6, 7; General Biology; *Geology* 2 (Thesis); History 4; Pedagogy 2, 3, 4, 8; Philosophy 3, 5, 6, 7; *Physiology* 3 (Thesis); Psychology 2, 7; *Zoölogy* 7 (Thesis).

Suggestions Concerning Courses of Study.

On account of the numerous and extensive changes made in the contents and arrangement of the natural science group of studies since the publication of the last catalogue, the following suggestions concerning courses of study are made as an aid to an intelligent election:

Students desiring major courses in the biological subjects and the related sciences, as a preparation for medical study, may take with advantage, in addition to the subjects required, zoölogy 3; botany 6; the physics, physiology, and German of the second year; mineralogy,

embryology, bacteriology, and geology 4 in the third year; and anthropology and ethnology, ethics, general biology, and thesis work in the fourth year.

Those wishing to concentrate their major work in zoölogy only, may take courses 1 and 4 to 7 in zoölogy, beginning with the second term of the freshman year, and minor courses in physiology, physics, and botany in the second year, meteorology or mineralogy 1 and geology 4 in the third year, and anthropology, general biology, and thesis investigation during the senior year.

For a zoölogical course with principal reference to entomology, zoölogy 2 may be taken instead of 1, and course 5 omitted from the above list.

The student desiring to specialize in physiology should take zoölogy 3 and follow it with all the physiology offered, except course 4. His work may be otherwise like that suggested above for the zoölogical specialist, with the omission of minor physiology.

A special course in botany may be made up on similar lines to those of the special zoölogical course by taking, instead of major zoölogy, the botanical courses 1 to 4 in the second and third years, preceded by zoölogy 8 in the freshman year, and followed by botany 5 (thesis work).

Students who desire to make the most of the offerings in geology are advised to begin their mineralogy in the fall term of the sophomore year; to take geology in the winter term and spring terms of that year, and the fall term of the junior year; and to finish their mineralogy during the winter and spring terms of the junior year, and thesis work in the senior year.

DESCRIPTIONS OF DEPARTMENTS.

Botany.

Six courses of instruction are offered in this subject—five primarily intended to meet the wants of students making botanical work more or less a specialty, and the sixth occupying a single term, complete in itself, for students whose chief attention is given to other branches. Three to eight terms' work constitutes a major course; that of the single term, course 6, a minor course. To a very large extent natural objects are studied rather than books, but constant endeavor is made to introduce students to pertinent existing literature. In the laboratory much use is made of the compound microscope, and special attention is given to its manipulation for best results, and to the preparation of objects.

Geology and Mineralogy.

In this department four courses are offered in geology and two in mineralogy. For those students who wish more than a general acquaintance with these subjects a major course covering thirty-six weeks (360 hours) of class room and laboratory instruction has been arranged in each, and a supplementary course of twenty-two weeks (220 hours) is offered to those who select a geological subject for a thesis.

Engineers who wish an acquaintance with those portions only of geology which bear most strictly on their future work are offered a minor course of eleven weeks (110 hours.)

A minor course of eleven weeks (110 hours) is offered to those desiring merely an outline of the most prominent facts and theories of geology with some idea of the methods by which the geologist arrives at his conclusions. In mineralogy one term's work may be taken for a similar purpose.

Zoölogy.

Zoölogy is taught in eight courses: Three terms of major work, variously combined to form three courses, primarily for students in the school of natural science; a term of embryology for those who have taken one of the preceding courses; two terms in entomology to follow upon two terms of the major work above mentioned; a year's work in comparative anatomy, zoölogical œcology, or systematic zoölogy (including palæontology), for advanced students only; a year's work in independent investigation (senior) for those who select a zoölogical subject for the graduating thesis;. and a general course of a single term, offered as a minor in the school of natural science and as an elective to the students of the University at large. The leading objects of these courses in zoölogy are thus seen to be manifold—partly general and partly special. Only the first term's work is necessarily common to all students in the college who desire to make zoölogical study a prominent feature of their course. At the end of this term three divergent lines of work are open, one leading mainly towards entomology, a second towards physiology and medical study, and a third towards advanced zoölogy—anatomical, systematic, or œcological.

The department is amply supplied with excellent laboratories, thoroughly furnished and equipped, and with the apparatus of instruction and investigation.

Physiology.

The main special objects of the courses in human physiology are as follows: (1) to give to prospective students of medicine a detailed practical

knowledge of the normal histological structure and vital processes of the body and a working familiarity with the instruments of precision of use in the investigation of disease. (2) To give to students of all branches of biology a training in deducting logically necessary conclusions from data obtained by their own observations. (3) To furnish such a knowledge of physiology as will serve as a basis for future studies in hygiene.

The laboratory method of instruction is chiefly followed, supplemented, when desirable, by lectures, demonstrations, references to standard literature, and recitations. The laboratory work predominates in the major and advanced courses; the lectures, demonstrations, and recitations in the minor course. In the more advanced courses each subject is treated, so far as time will permit, as if it were an original investigation. The student is guided to the best methods to be pursued, but the results are left for him to discover. At frequent intervals the results obtained are reviewed by the instructor, and, when necessary, completed, unified, and correlated with the facts learned from previous investigations, care being taken to show the student wherein and why he failed to obtain a full knowledge of the subject.

THE CHEMICAL GROUP.

The instruction in the subjects of the chemical group has a twofold object. On the one hand it is directed by the purpose of imparting such a knowledge of chemistry and the allied branches as shall best enable the student to apply the principles of the science to the practical work of the analytical and technical chemist, or to that of the pharmacist and druggist. On the other hand, opportunities are provided for such students as desire to direct their energies to the purely scientific side of the subject with the view to preparing themselves to become teachers of chemistry or investigators in the various branches of pure chemistry. Certain specified courses are required of all candidates for graduation in chemistry, but by means of the options in chemical subjects the scope of the work is made sufficiently broad to enable the student to specialize in the various lines open to the chemist or the pharmacist. The fourth year is mainly devoted to the investigation of some chemical problem, the subject being chosen and the research prosecuted under the direction and with the advice of the professor in charge, and with particular reference to the student's aims.

Students not members of the College of Science, who desire to pursue studies in the chemistry of agriculture or in metallurgy, may have ample opportunity for such work on consultation with the professors in charge.

Classification of Subjects.

REQUIRED.

Chemistry 1 (General introductory), 1 credit.
Chemistry 2 (Descriptive inorganic), 1 credit.
Chemistry 3a, 3b, (Qualitative analysis), 2 credits.
Chemistry 4 (Elements of organic chemistry), 1 credit.
Chemistry 5a, 5b, (Quantitative analysis), 2 credits.
Chemistry 9 (Organic chemistry) 2 credits.
Mathematics (1, 3), 2 credits.
Physics (1, 3), 3 credits.
German (1, 2, 4), 5 credits.
Military (1, 2), 2 credits.
English (8), 2 credits.

ELECTIVES.

List A. (Chemical.)

Theoretical Chemistry (12), 1 credit.
Advanced General Chemistry (7), 1, 2 or 3 credits.
Chemical Technology (6), 1 credit.
Toxicology (12), 1 credit.
Iron and Steel (8), 1 credit.
Agricultural (13), 2 credits.
Sanitary and Hygienic (10), 1 credit.
Proximate Organic (15), 1 credit.
Investigations and Thesis (11), 2 credits.
Metallurgy and Assaying (14), 1 credit.

List B. (General.)

Botany (6 or 1), 1 or 3 credits.
Mineralogy (1, 2), 1 or 3 credits.
Physiology (4 or 1), 1 or 2 credits.
Zoölogy (8 or 1), 1 or 3 credits.
Geology (4 or 1), 1 or 3 credits.
Mathematics (5, 6, 7), 4 credits.
English (7), 3 credits.

List C.

French (1, 2, 5), 3 or 6 credits.
German (6), 1 credit.
History (1 or 4), 1 to 3 credits.
Chemistry (advanced work), 1 to 3 credits.
Psychology (1 to 8), 1 to 9 credits.
Philosophy (1 to 8), 1 to 8 credits.
Economics (1 to 8), 1 to 7 credits.
Pedagogy (1 to 8), 3 credits.
Meteorology (1), ½ credit.
Anthropology (1, 2), 1 credit.
Astronomy (4), 1 credit.
Botany (2), 1 credit.
Materia Medica, 2 credits.
Art and Design (5), 1 credit.
Electrical Engineering (1), 1 credit.
Military (3).

Requirements for Graduation.

In order to graduate from the course in chemistry, the candidate must have completed all of the required courses (23 credits), and must have at least six credits additional for subjects to be chosen from the chemical list A, of electives. For the twelve remaining credits he must choose six subjects from list B and six from lists B and C. He must have received, in all, forty-one full term credits, and presented an acceptable thesis.

Courses of Instruction by Years and Terms.

The courses mentioned in the following list may be taken only in the term indicated; those whose names are italicized, if taken at all, must be taken in the designated year; and all the others should be so taken if practicable.

FIRST YEAR.

1. *General Chemistry* (1); German 4; Mathematics 1; Military 1, 2.
2. *Descriptive Inorganic Chemistry* (2); *Qualitative Analysis* (3a); German 4; Mathematics 3; Military 1, 2.
3. *Descriptive Inorganic Chemistry* (2); *Qualitative Analysis* (3b); *Elements of Organic Chemistry* (4); German 1, 4; Conic Sections; Military 1, 2.

SECOND YEAR.

1. *Quantitative Analysis* (5a); Mineralogy 1; German 2; Physics 1 and 3; Mathematics 7.
2. *Quantitative Analysis* (5b); *Advanced General Chemistry* (7); Agricultural Chemistry (13); Chemical Technology (6); Geology 1; German 6; Physics 1 and 3; Mathematics 8.
3. Quantitative Analysis (5c): Advanced General Chemistry (7); Agricultural Chemistry (13); Chemical Technology (6); Geology 1; German 6; Physics 1 and 3; Mathematics 9.

Third Year.

1. Advanced General Chemistry (7); Metallurgy and Assaying (14); Iron and Steel Analysis (8); Botany 1; Geology 1; Mineralogy 1; Pedagogy 1; Philosophy 1, 2; *Rhetoric and Themes* (English 8); Materia Medica 1; Psychology 1; History 1; French 1, 5; Pharmacy 1, 3.
2. Advanced General Chemistry (7); *Organic Chemistry* (9); Theoretical Chemistry (12); Botany 1; Physiology 1; Zoölogy 1, 8; Mineralogy 2; Pedagogy; Philosophy 3, 6, 8; *Rhetoric and Themes* (English 8); Materia Medica 1; Psychology 2, 3; History 1; French 1, 5; Pharmacy 2.

3. Advanced General Chemistry (7); *Organic Chemistry* (9); Theoretical Chemistry (12); Botany 1, 6. Physiology 1; Zoölogy 1; Geology 4; Mineralogy 2; Pedagogy; Philosophy 3, 7; *Rhetoric and Themes* (English 8); Materia Medica 1; Psychology 2; History 1; French 1, 5; Pharmacy 2.

FOURTH YEAR.

1. Sanitary Analysis (10); Advanced Quantitative Analysis (18); Advanced General Chemistry (7); Zoölogy 1; Meteorology 1; Pedagogy; English; Materia Medica; Psychology 4, 7, 8; History 1; French 2; Pharmacy 4.
2. Investigation (11); Advanced Quantitative Analysis (18); Advanced General Chemistry (7); Physiology 1; Zoölogy 8; Pedagogy; Philosophy 5, English; Materia Medica; Psychology 6, 7, 8; History 1, 4; French 4; Pharmacy 4.
3. Investigation (11); Proximate Organic Analysis (15); Advanced General Chemistry (7); Physiology 1; Pedagogy; Philosophy 4; English; Materia Medica; Psychology 5, 7, 8; History 1; French 2; Pharmacy 3, 5.

Pharmacy.

Courses in Chemistry and Pharmacy are offered leading to the degree of Bachelor of Science.

The general requirements are the same as in the chemical course proper; more specifically there are required:

Chemistry (1, 2, 3a, 3b, 4, 5a, 9), 8 credits.
Mathematics (1, 3), 2 credits.
German (1, 2, 4), 5 credits.
English (8), 2 credits.
Physics, 3 credits.
Military, 2 credits.
Investigation and Thesis, 2 credits.
Pharmacy (1), 1 credit.
Pharmacy 2 (Pharmaceutical Preparations), 2 credits.
Pharmacy 3 (Pharmacognosy), 2 credits.
Pharmacy 4 (Pharmaceutical Technology), 2 credits.
Pharmacy 5 (Pharmaceutical Assaying), 1 credit.
Materia Medica, 2 credits.
Botany (1), 3 credits.

The subjects of the four remaining credits which are required for graduation may be selected from chemical electives lists A, B, and C.

Courses of Instruction by Years and Terms.

The courses mentioned in the following list must be taken in the indicated year and term:

FIRST YEAR.

1. General Chemistry 1; Mathematics 1; German 5; Military 1, 2.
2. Descriptive Inorganic Chemistry 2; Qualitative Analysis 3a; Mathematics 3; German 5; Military 1, 2.
3. Descriptive Inorganic Chemistry 2; Qualitative Analysis 3c; Elements of Organic Chemistry 4; German 5; Military 2.

SECOND YEAR.

1. Quantitative Analysis 5a; Pharmacy 1; Botany 1.
2. Pharmaceutical Preparations; German 6; Botany 1.
3. Pharmaceutical Preparations; German 6; Botany 1.

THIRD YEAR.

1. Physics 1 and 3; Pharmacognosy 3; Materia Medica.
2. Physics 1 and 3; Chemistry 9; Materia Medica.
3. Physics 1 and 3; Chemistry 9; Pharmaceutical Assaying.

FOURTH YEAR.

1. Pharmaceutical Technology; Elective; Elective.
2. Pharmaceutical Technology; Investigation and Thesis; Elective.
3. Pharmacognosy 3b; Investigation and Thesis; Elective.

Short Course in Pharmacy.

A briefer course in pharmacy is offered, covering two years, as follows:

FIRST YEAR.

1. Pharmacy 1; Pharmacognosy; Botany 1; General Chemistry.
2. Pharmaceutical Preparations; Pharmaceutical Botany; Descriptive Inorganic Chemistry 2; Qualitative Analysis 3a; Military 1, 2.
3. Pharmaceutical Preparations; Pharmaceutical Botany; Descriptive Inorganic Chemistry 2; Qualitative Analysis 3b; Military 2.

SECOND YEAR.

1. Pharmaceutical Technology; Materia Medica; Quantitative Analysis 5a; Military 2; Advanced work in Chemistry or Pharmacy.
2. Pharmaceutical Technology; Materia Medica; Quantitative Analysis 5b; Advanced work in Chemistry or Pharmacy.
3. Prescription work and Pharmacognosy; Pharmaceutical Assaying; Organic Chemistry 9; Advanced work in Chemistry or Pharmacy.

By an earnest prosecution of the studies laid out in this course the student may thoroughly prepare himself for the examinations required by the State Board of Pharmacy for registration as pharmacists.

The work outlined above leaves no time during the college year for the drug store practice required by law for a registered pharmacist. This practice must therefore be had at other times.

THE MATHEMATICAL GROUP.

The mathematical group of studies includes the entire offering of the University courses in pure mathematics, physics, and astronomy.

The instruction in pure mathematics comprises three distinct lines of study differing in extent, in subject matter, and in the method of presentation. The first is for students in the Colleges of Agriculture, Science, and Literature, and occupies two terms, beginning in the fall. It has for its object to promote habits of mental concentration and continuity of thought, to develop the capacity to form and combine abstract conceptions and to cultivate deductive reasoning. The second is primarily offered to students in the College of Engineering and occupies two years, also beginning in the fall. In addition to the educational object just given, the purpose is to enable the student to meet the requirements of his engineering studies. The greater part of the time is necessarily taken up with the theory and its applications to geometrical magnitudes. The third is presented for students who wish to advance further in their mathematical work than the engineering student has the time for. It is hoped that this will meet the requirements of those who wish to fit themselvs for instructors, and of those who study the science for the love of it.

Parallel with the pure mathematics of the junior and senior years, two lines of associated work in applied mathematics—physical and astronomical—are offered, either of which may be, and one of which must be, taken by the student wishing to graduate in the studies of the mathematical group. One of these lines leads from the physics of the sophomore year through the mathematical theory of electricity and magnetism, heat, light, and sound; and the other through surveying and mechanics to celestial mechanics and to general and mathematical astronomy.

Classification of Subjects Required.

Mathematics 2 (College Algebra), 1 credit.
Mathematics 4 (Trigonometry) 1 credit.
Mathematics 6 (Analytical Geometry), 1 credit.

Engineering Drawing (1), 1 credit.
Engineering Drawing 2 and 3 (Descriptive Geometry and Lettering), 2 credits.
Mathematics 7 (Differential Calculus), 1 credit.
Mathematics 8 (Advanced Analytical Geometry), 1 credit.
Mathematics 9 (Integral Calculus), 1 credit.
Mathematics 10 (Theory of Equations), 1 credit.
Mathematics 11 (Theory of Determinants), 1 credit.
Mathematics 12 (Theory of Invariants), 1 credit.
Mathematics 13 (Theory of Functions), 1 credit.
Mathematics 14 (Method of Least Squares), ½ credit.
Mathematics 15 (Seminary and Thesis), 1½ credits.
Mathematics 16 (Differential Equations), 2 credits.
Mathematics 17 (Geometry of Space) 1 credit.
Mathematics 18 (Higher Plane Curves), 1 credit.
English (8), 2 credits.
Military Science (1, 2), 2 credits.
German (1, 2, 6), or French (1, 2), 6 credits.
Physics (1), 2 credits.

ELECTIVES.

List A. (Astronomical.)

Civil Engineering (10), 1 credit.
Theoretical and Applied Mechanics (1), 1 credit.
Celestial Mechanics, 1 credit.
Astronomy, 1 credit.
Mathematical Astronomy, 1½ credits.

List B. (Physical.)

Physics (1, 3), 3 credits.
Physics 5 (Theory of Electricity and Magnetism), 3 credits.
Physics 6 (Theory of Light, Heat, and Sound), 3 credits.

List C.

French (1, 2), or German (1, 2, 6), 6 credits.
Latin (1, 2, 3), 3 credits.
English (1), 3 credits.
History (1 or 4), 1 or 3 credits
Anthropology (1, 2), 1 credit.
Chemistry (1, 3a, 3b, or 4), 1 or 3 credits.
Meteorology (1), ½ credit.
Mineralogy (1, 2), 1 or 3 credits.
Geology (1, 3, 4), 1 or 3 credits.
Botany (1 or 6), 1 or 3 credits.
Zoölogy (1 or 8), 1 or 3 credits.
General Biology (1), 1 credit.
Physiology (1 or 4), 1 or 3 credits.
Psychology (1 to 8), 1 to 4 credits.
Pedagogy (1 to 8), 1 to 4 credits.
Economics (1 to 8), 1 to 4 credits.
Philosophy (1 to 8), 1 to 4 credits.

Requirements for Graduation.

To graduate as a Bachelor of Science in the mathematical studies, it will be necessary for the student to complete the required subjects of this group, together with those of either the astronomical or the physical list [(A or B) of electives. The necessary number of forty full-term credits for University studies may be made up by elections from lists A, B, and C.

Courses of Instruction by Years and Terms.

The subjects of the mathematical group will be taught at present according to the following tabular arrangement. Subjects whose names are italicized must be taken in the year indicated.

FIRST YEAR.

1. *Engineering Drawing* 1; *English* 1, *French* 1, *or German* 1; *Mathematics* 2; *Military* 1, 2.
2. *Engineering Drawing* 2, 3; *English* 1, *French* 1, *or German* 1; *Mathematics* 4; *Military* 1, 2.
3. *Engineering Drawing* 2; *English* 1, *French* 1, *or German* 1; *Mathematics* 6; *Military* 2.

SECOND YEAR.

1. French 2, German 2; *Mathematics* 7; *Military* 2, 3; *Physics* 1, 3.
2. French 2, German 2; *Mathematics* 8; *Military* 2, 3; *Physics* 1, 3.
3. French 2, German 2; *Mathematics* 9; *Military* 2, 3; *Physics* 1, 3; *Civil Engineering* 10.

THIRD YEAR.

1. Botany 1; Chemistry 1; Economics 1; *English* 8; History 1; Latin 1; *Mathematics* 10; *Theoretical and Applied Mechanics* 1; Meteorology; Mineralogy 1; Pedagogy 1, 2, 3; Philosophy 1, 2; Physics 5; Physiology 4; Psychology 1, 4.
2. Astronomy 1; Botany 1; Chemistry 3a; Economics 2; *English* 8; Geology 1a; History 1, 4; Latin 2; *Mathematics* 11; Mineralcgy 2; Pedagogy 1, 2, 3; Philosophy 3, 6, 8; Physics 5; Physiology 1; Psychology 2, 3; Zoölogy 1, 2, 3, 6.
3. Botany 1; Chemistry 3b, 4; Economics 7; *English* 8; Astronomy 2; Geology 1b; History 1; Latin 3; *Mathematics* 12; Mineralogy 2; Pedagogy 2, 3; Philosophy 3, 7; Physics 5; Physiology 1; Psychology 2, 5; Zoölogy 1, 2.

FOURTH YEAR.

1. Anthropology 1, 2; Astronomy 3; Botany 1, 2; Chemistry 1; Economics 1, 3, 6; Geology 1c; History 1, 2; *Mathematics* 13, 14, 15; Pedagogy 1, 2, 3, 7, 8; Philosophy 1, 2; Physics 6; Physiology 2, 4; Psychology 1, 4, 7; Zoölogy 1, 3, 6.

2. Astronomy 3; Botany 1, 3; Chemistry 3a; Economics 2, 3, 6; History 1, 3, 4; *Mathematics* 15, 16, 17; Pedagogy 1, 2, 3; 6, 7, 8; Philosophy 3, 5, 6, 8; Physics 6; Physiology 2; Psychology 2, 3, 6, 7; Zoölogy 4, 5, 6.
3. Astronomy 3; Botany 1, 4; Chemistry 3b, 4; Economics 4, 5, 7; General Biology 1; History 1, 3; *Mathematics* 15, 16, 18; Pedagogy 2, 3, 4, 5, 8; Philosophy 3, 4, 5, 7; Physics 6; Physiology 2; Psychology 2, 5, 7; Zoölogy 4, 6.

Suggestions concerning Courses of Study.

The studies of the mathematical group may best be taken according to the following outlines of courses in mathematics and physics, and in mathematics and astronomy respectively.* The electives provided for in the junior and senior years may be readily chosen by a reference to the preceding lists of electives and to the scheme or table of subjects by years and terms.

Course in Mathematics and Physics.

FIRST YEAR.

1. College Algebra; Engineering Drawing; German or French; English; Military.
2. Trigonometry; Descriptive Geometry and Lettering; German or French; English; Military.
3. Analytical Geometry; Descriptive Geometry; German or French; English; Military.

SECOND YEAR.

1. Differential Calculus; Physics 1, 3; German or French; Military.
2. Advanced Analytical Geometry; Physics 1, 3; German or French; Military.
3. Integral Calculus; Physics 1, 3, or Surveying; German or French; Military.

THIRD YEAR.

1. Theory of Equations; Physics 5; Electives; English 8.
2. Theory of Determinants; Physics 5; Electives; English 8.
3. Theory of Invariants; Physics 5; Electives; English 8.

*The two courses are identical for the freshman and sophomore years.

FOURTH YEAR.

1. Theory of Functions; Method of Least Squares; Physics 6; Mathematical Seminary and Thesis: Electives.
2. Differential Equations; Geometry of Space; Physics 6; Mathematical Seminary and Thesis; Electives.
3. Differential Equations; Higher Plane Curves; Physics 6; Mathematical Seminary and Thesis; Electives.

Course in Mathematics and Astronomy.

The freshman and sophomore years are the same as in the preceding course.

THIRD YEAR.

1. Theory of Equations; Mechanics; Electives; English 8.
2. Theory of Determinants; Celestial Mechanics; Electives; English 8.
3. Theory of Invariants; General Astronomy; Electives; English 8.

FOURTH YEAR.

1. Theory of Functions; Method of Least Squares; Mathematical Astronomy; Mathematical Seminary and Thesis; Electives.
2. Differential Equations; Geometry of Space; Mathematical Astronomy; Mathematical Seminary and Thesis; Electives.
3. Differential Equations; Higher Plane Curves; Mathematical Astronomy; Mathematical Seminary and Thesis; Electives.

THE PHILOSOPHICAL GROUP.

The philosophical group includes those sciences which deal both with man as an individual, in the mental and moral spheres, especially as these are connected with his physical being, and also with man in society. The branches of knowledge included in the group occupy a place among the divisions of biological science, and it is intended to carry the spirit of biology, in the commonly accepted sense, into the investigation of these subjects. The general aim and scope of the group is the study of the character and development of the individual and of society, of the relations of man to external nature, of the influence of natural selection on social development, and, finally, of the possible effect of artificial selection on that development, through both subjective and objective influences. In method of treatment, while not neglecting the literary value of the subjects, the effort is made to arouse the scientific spirit, and to keep in close touch with the other work in the college.

Under this caption the subjects of psychology, pedagogy, economics and philosophy are offered in the College of Science as electives to all chemical and natural science students, and to all students who desire to specialize in the philosophical subjects, with studies in the physical and natural sciences as a preparation for them. All the studies of this group are junior and senior subjects, open, as a rule, to those students only who have done two years of University work.

Classification of Subjects.

required.

The same as either the natural science or chemical group.

elective.

List A (Major Courses).	*List B (Minor Courses).*
Psychology (1 to 7), 7 credits.	Psychology (1), 1 credit.
Pedagogy (1 to 8), 2 to 13 credits.	Economics (1), 1 credit.
Economics (1 to 8), 2 to 7 credits.	Philosophy (1), 1 credit.
Philosophy (1 to 8), 2 to 8 credits.	

List C.

The same as in the natural science group, with the omission of philosophical subjects.

Requirements for Graduation.

To graduate from the College of Science in the studies of this group, the student must either complete the subjects of the required list* in the chemical group, or must carry those of the corresponding list* in the natural science group, and earn six full credits additional for major natural science studies. He must further do twelve terms' work, or their equivalent, on subjects in the philosophical group; must take minor courses in all the philosophical subjects (except pedagogy) in which he has not completed a major course; and must prepare and present a satisfactory thesis on a subject belonging to some department of the philosophical group of studies in which he has done at least five full terms of major work.

*Two years of French may be offered in the philosophical group in place of the five terms of German required.

DESCRIPTION OF DEPARTMENTS.

Economics.

The instruction in this subject is based on the work of the first two years in science. The relation of the study to the biological sciences commonly so called is emphasized and kept steadily in view. In the general courses the aim is to study society as an organism, to trace its evolution from primitive forms to its present complex structure, to examine the nature of its environment and its adaptation thereto, its present normal character and operations, and the forces, subjective and objective, which are at work tending to change its structure. The courses on special topics are treated as detailed studies of special organs and functions, their character as such is described, and their relations to one another and to the whole social organism is studied.

The plan of instruction combines recitations, lectures, discussions and reports by students on assigned topics. The advanced courses are divided into two groups and given in alternate years.

Pedagogy.

The work in pedagogy includes both the theory and practice of teaching. The purpose of public schools, the relative value of studies, their relation to one another, and the methods of teaching them, are some of the theoretical subjects to be considered. The recent establishment of a Model School under the control of the department of pedagogy affords an opportunity for applying the theory advanced. Students making the sciences a specialty, may, if they wish, direct their attention chiefly to the teaching of those subjects; they may study particularly the relative worth of science as a part of the school curriculum, its relation to the other studies, the selection of suitable subject matter and the method of teaching it. Also they may give as much instruction in the Model School in the sciences as they choose, subject to the criticism of an expert teacher.

Philosophy.

The courses offered comprise the subjects of History of Philosophy, Metaphysics, Ethics, and Logic, and are open to students who have completed at least two years of University work. They are planned to meet the needs of those who make Philosophy their specialty and also of those who desire an acquaintance with the subjects as a means of general

culture. It is a constant aim to emphasize the meaning and interest of Philosophy and the relations of the problems to the life of man. The subjects are taught by lectures, recitations, and the seminary method.

Psychology.

The aim of the work in this department is to furnish the student, largely by means of inductive study, a knowledge of the nature of mind, its modes of behavior, the forms under which it manifests itself, the laws according to which it unfolds and develops, and the influence of environment upon this development. In the various courses the laboratory method of instruction is brought into prominent use. By means of appropriate apparatus the sensations are studied experimentally and the conditions under which the various sensations arise are accurately determined. Apparatus is also employed to demonstrate to the class the reciprocal relation that obtains between body and mind and to test and measure memory, attention, association, and other higher psychical forces. All along throughout the courses an effort is made to put Psychology upon an exact basis as a natural science.

The elementary forces of mentality as exhibited in infant life are carefully studied with a view to determine some of the components of the adult mind. A comparative study of the mental life of animals, the lower as well as the higher forms, is undertaken with a view to throw some light upon the morphology of mind. The mental life of defectives as well as pathological states of mind are discussed in their relation to the normal type. The advanced laboratory work is of a nature to develop a spirit of independent research on the part of the student. The relation of Psychology to the physical biological sciences is kept conspicuously in view, so that the student may be assisted in his endeavor to bring the manifestations of mind and matter into a related whole.

COLLEGE OF LITERATURE.

FACULTY.

THOMAS J. BURRILL, PH.D., LL.D., Acting Regent, Botany.
SAMUEL W. SHATTUCK, C.E., Mathematics.
EDWARD SNYDER, A.M., *Dean*, German.
FRANK F. FREDERICK, Art and Design.
EDBRIDGE R. HILLS, Captain 5th Artillery, U. S. A., Military Science.
HERBERT J. BARTON, A.M., *Secretary*, Latin.
CHARLES M. MOSS, PH.D., Greek.
DANIEL K. DODGE, PH.D., English.
FRANK M. MCMURRY, PH.D., Pedagogics.
DAVID KINLEY, PH.D., Economics.
JAMES D. BRUNER, PH.D., Romance Languages.
GEORGE W. MYERS, M.L., Mathematics.
KATHARINE MERRILL, A.B., English.
WILLIAM O. KROHN, PH.D., Psychology.
ELIZABETH C. COOLEY, A.B., German.
EDGAR J TOWNSEND, PH.M., Mathematics.
ANITA M. KELLOGG, B.E., Elocution.
ARTHUR H. DANIELS, PH D., Philosophy.
AMBROSE P. WINSTON, A.B., History.
EDITH A. SHATTUCK, Drawing.
THOMAS A. CLARK, B.L., English.
HERMAN S PIATT, A.B., French.
CHARLES W. CARTER, B.L., German.
HARLEY E. REEVES, Military Science.

COLLEGE OF LITERATURE.

The outline of studies presented below gives a view of what is contemplated in the several departments represented, while the yearly offerings set forth what may and what may not be taken in those years. The restriction of certain studies to definite periods is due to the requirements of the studies themselves, to their proper sequences, or to

the demands of the other colleges, in which a part of the work of students in this college is done.

The plan proposes an adjustment of studies to the needs of students who seek either a general or special training, which shall be in harmony with the wisest thought upon this important matter. It is conceded that the propensity of the student shall be consulted, but it is likewise demanded that he shall not be afforded opportunity for an ill-advised election of studies; and the end should be an educated power of self-direction that shall be immediately available for the practical purposes of life.

The college aims to harmonize the desire of the student and the demands of a sound training, as follows: (1) By listing a minimum of required branches. (2) By offering elections at the very outset, but requiring that they shall be two in number (from list A), and be pursued consecutively for at least two years. (3) By opening a larger range of electives at this point, and yet requiring definiteness of selection (list B). (4) By making it possible from this point to specialize, to a large extent, either by following lines already begun, or by taking up some other. (5) By a development in the courses from a less to a more comprehensive treatment of subjects, and by stimulating thereby a like growth in the student's apprehension and grasp of general ideas. In the later years of his study this purpose takes the form of the so-called seminary method, wherein it is expected that the results of all previous training will be brought to bear directly upon the investigation at first hand of topics requiring research, systematic treatment, and suitable presentation.

As aids to this intention, there are various auxiliaries. The library of 26,000 volumes is well supplied with books of special and general character; the reading room has about 200 periodicals, domestic and foreign, upon its shelves; the departments are in possession of special apparatus, such as maps, charts, relief pieces, photographs, technical books, etc., in abundance, while the appliances of the other colleges are at the service of students in this, where overlapping occurs. No distinction is made between the students of the different colleges in the treatment of subjects common to both. The application of methods in the other colleges to the subjects there dealt with, may be seen under the appropriate headings.

CLASSIFICATION OF STUDIES AND REQUIREMENTS FOR GRADUATION.

Forty term credits, including military, constitute the requirement for a degree in the literary courses. Every student must take the

required subjects (nine terms); he must select at least two subjects from list A, not less than six terms each (twelve terms), and three subjects from list B (three terms), and may choose from lists A, B, and C subjects which will give him sixteen additional credits.

For the degree of A.B., the two subjects must be taken in Greek and Latin; for the degree of B.L., they may be selected from Economics, English, French, German, Latin, Pedagogics, Philosophy, or Psychology.

REQUIRED.

History (—), 3 credits
Mathematics (1, 3), 2 credits.
Military (1, 2), 2 credits.
English (2) and Oral Rhetoric and Oratory (1), 2 credits.

ELECTIVE.

List A (Major courses).

Economics (1 to 8), 6½ credits.
English (1, 3, 5), 6 to 9 credits.
French (1, 2, 3), 6 to 9 credits.
German (1, 2, 3), 6 to 9 credits.
Greek (1 to 9), 6 to 9 credits.
History (—), 6 to 9 credits.
Latin (1 to 9), 6 to 9 credits.
Mathematics (2 to 18), 6 to 14½ credits.
Pedagogy (1 to 8), 6 to 9 credits.
Philosophy (1 to 8), 6 to 8 credits.
Psychology (1 to 8), 6 to 9 credits.

List B (Minor courses).

Astronomy (4), 1 credit.
Economics (1), 1 credit.
History (—), 2 credits.
History (—), 1 credit.
Philosophy (6, 7, 8), 2½ credits.
Psychology (1), 1 credit.

List C.

Anthropology (1, 2), 1 credit.
Art and Design (1,6), 3 to 6 credits.
Astronomy (1, 2, 3), 3½ credits.
Botany (1, 2, 3, 4, 6), 1 to 3 or 6 credits.
Chemistry(1, 3a, 4, 5a, 5b, 5c, 7, 9, 10), 1 to 3 or 6 credits.
Economics (—), 3 credits.
English (1, 4), 4½ credits.
Entomology (4), 2 credits.
French (4), 3 credits.
Geology (1, 4), 1 to 3 credits.
German (4), 3 credits.
Greek (1, 2, 3), 3 credits.
Italian (1), 3 credits.
Latin (1, 2, 3), 3 credits.
Mathematics (2, 4 to 18), 3 to 14½ credits.
Meteorology (1), ½ credit.
Mineralogy (1), 1 credit.

Oral Rhetoric (2, 4), 1 credit.
Pedagogy (1 to 8), 1 to 3 credits.
Philosophy (1 to 8), 1 to 3 credits.
Physiology (1, 2, 4), 1 to 5 credits.
Physics (1, 2, 3, 5, 6), 1 or 9 credits.
Ssychology (1 to 8), 1 to 3 credits.
Ppanish (1), 3 credits.
Zoölogy (1, 2, 3, 5, 8), 1 to 3 or 7 credits.

COURSES OF INSTRUCTION BY YEARS AND TERMS.

The following statement gives the terms in which the subjects are taught and the year in which they should be taken. The numerals refer to the courses marked by the same numerals in the alphabetical Statement of Courses of Instruction.

FIRST YEAR.

1. Art and Design 6; Botany 1; Chemistry 1; English 1, 2; French 1; German 1; Greek 1; Latin 1; Mathematics 1 or 2; Military 1, 2; Physical Culture.
2. Art and Design 6; Botany 1; Chemistry 3a; English 1, 2; French 1; German 1; Greek 2; Latin 2; Mathematics 3; Military 1, 2; Physical Culture ; Zoölogy 1, 8.
3. Art and Design 6; Astronomy 4; Botany 1, 6; Chemistry 4; English 1, 2; French 1; German 1; Greek 3; Latin 3; Mathematics 5; Military 2; Physical Culture; Zoölogy 1.

SECOND YEAR.

1. Art and Design 6; Botany 1, 2; Chemistry 1, 5a; English 2, 3; French 2; German 2; Greek 4; History —; Latin 4; Mathematics 7; Military 2, 3; Mineralogy 1; Physical Culture; Physics 1 and 3, 2; Physiology 4; Zoölogy 1, 3.
2. Art and Design 6; Botany 3; Chemistry 3a, 5b, 7, 9; English 2, 3; French 2; Geology 1, 4; German 2; Greek 5; History —; Latin 5; Mathematics 8; Military 2, 3; Mineralogy 2; Physical Culture; Physics 1 and 3, 2; Physiology 1; Zoölogy 1, 4, 5, 8.
3. Art and Design 6; Botany 1, 4, 6; Chemistry 5c, 7, 9; English 2, 3; French 2; Geology 1; German 2; History —; Mathematics 9; Military 2, 3; Mineralogy 2; Physical Culture; Physics 1 and 3, 2; Physiology 1; Zoölogy 1, 4.

THIRD YEAR.

1. Botany 1, 2; Economics 1; English 4, 5; French 3; Geology 1; German 3; Greek 7; History —; Italian 1, in 1894 — 5; Latin 7; Mathematics 10; Meteorology 1; Mineralogy 1; Oral Rhetoric and Oratory 1, 2; Pedagogy 1, 2, 3; Philosophy 1, 2; Physiology 4; Physical Culture; Physics 5; Psychology 1; Zoölogy 3.

2. Botany 1, 3, 5; Economics 2; English 4, 5; French 3; Geology 1, 4; German 3; Greek 8; History —; Italian 1; Latin 8; Mathematics 11; Mineralogy 2; Oral Rhetoric and Oratory 1, 2; Pedagogy 1, 2, 3; Philosophy 3, 6, 8; Physics 2; Physiology 1; Physical Culture; Physics 5; Psychology 2, 3; Zoölogy 1, 4, 5. 8.
3. Botany 1, 4, 5, 6; Economics 5; English 4, 5; French 3; Geology 1; German 3; Greek 9; History —; Italian 1; Latin 9; Mathematics 12; Mineralogy 2; Oral Rhetoric and Oratory 1, 2; Pedagogy 2, 3, 4; Philosophy 3, 7; Physiology 1; Physical Culture; Physics 5; Psychology 2, 5; Zoölogy 1, 4.

FOURTH YEAR.

1. Economics 1, 3, 6, 8; English 6; French 4; German 4; History —; Mathematics 13, 14, 15; Oral Rhetoric and Oratory 2, 4; Pedagogy 7, 8; Philosophy 1, 2; Physics 6; Psychology 1, 7, 8; Spanish 1, in 1895-96; Zoölogy 1, 3.
2. Economics 2, 3, 6, 8; English 6; French 4; German 4; History —; Mathematics 15, 16, 17; Oral Rhetoric and Oratory 2, 4; Pedagogy 6, 7, 8; Philosophy 3, 5, 6, 8; Physics 6; Psychology 2, 3, 6, 7, 8; Spanish 1; Zoölogy 1, 4, 5. 8.
3. Economics 4, 5, 7, 8; English 6; French 4; German 4; History —; Mathematics 15, 16, 18; Oral Rhetoric and Oratory 2, 4; Pedagogy 4, 5, 8; Philosophy 3, 4, 5, 7; Physics 6; Psychology 2, 5, 7, 8; Spanish 1; Zoölogy 1, 4.

THE SELECTION OF STUDIES.

On coming to the University each student entering the College of Literature is earnestly recommended to consult with the professors having charge of the departments in which the work of list A is to be done. Such consultation will be of great utility in suggestions as to the studies to be pursued. It will moreover serve to acquaint the students with the professors most largely interested in the success of the work to be done and will tend to establish that cordial relationship that is so essential to the best results. In selecting studies, students must be careful to observe the sequences required for each as given under the separate subjects.

DESCRIPTION OF DEPARTMENTS.

Art and Design.

This work subserves a twofold purpose. (1) It affords to the students the opportunity to acquire such a knowledge of free hand drawing as their chosen courses may require. (2) It offers to such as have

a talent or taste for art the best facilities for pursuing studies in industrial designing or other branches of fine art.

In all courses the work is made of direct benefit to the students in other lines, and at the same time it aims to develop in them a love for, and an appreciation of, the beautiful.

Special students, not otherwise connected with the University, may enter this department upon payment of very moderate fees.

Economics.

The study of economics for undergraduates extends through the last two years. The work is so arranged that the student can take a continuous course for either one or two years. The introductory courses are repeated each year and the advanced courses are divided into two groups and given in alternate years. Text books are used in the introductory courses, but only as guides. Every student is required to make frequent short reports on assigned topics and to undertake at least one more elaborate piece of investigative work. The assigned readings are designed to cover as large a field as possible in the literature of the subject, to present all disputed matters from different points of view, and are supplemented by discussions and lectures. Educational development, acquaintance with the subject, and training for good citizenship are ends kept steadily in view.

English Language and Literature.

The work of the department during the first two years consists of the study of literature, together with two hours a week in the freshman year devoted to Rhetoric and Themes. During the last two years the time is divided between literature and language. English 2, is required of all students in the College of Literature, and English 1 and 2 are required for the degree of B. L.

A special course in literature of one year is offered to scientific and engineering students. The course in Rhetoric and Themes is required.

German.

The primary aim of instruction in the elementary classes is reading, so that the student may avail himself of the aid of foreign work relating to his particular department. Much importance, however, is attached to the study of language as a means of general training. A thorough study of the structure of the language is the basis; as much as possible

of this is done by practical work, analysis and composition, rather than by mere memorizing rules.

The more advanced classes take up the study of the classic poets and prose writers. The third year's work consists of critical study of the prominent literary works; composition; history of the literature in German. Lectures are given in German and the use of the language in study is demanded.

The fourth year is an elementary course of Old German and Gothic.

The one year course is designed for the technical students with a minimum of grammar and a maximum of reading.

Greek.

The general purposes of the outline which follows (including courses 1–6) are: First, to teach the Greek language. Second, to cause students to appreciate its literature. Third, to call attention to those numerous points in the history, thinking, and institutions of the Greeks which illustrate similar phenomena noticeable among ourselves. To accomplish the first item, due attention is paid to the principles of grammar, particularly in making the syntax appear as the evidence of orderly mental procedure, and by continual practice in extemporaneous translation. The second is effected by a study of the surroundings and spirit of an author, and of those literary devices which give character to his productions. The third end is reached through familiar talks upon suitable topics as they are met.

In courses 7 and 8 a more mature line of work is contemplated, for which courses 1 to 6 are a graded preparation. Ample library and other appliances are provided. Course 9 is more general, but is expected to articulate, for classical students, with courses 1–8.

History.

In the work of this department, while political and dynastic narrative is allowed an important place, it is hoped further to give the student an understanding of the part that has been performed by each of the chief forces and activities which constitute the life of nations, such as the intellectual and the moral movements; the influences of superstition and religion; social instincts and economic forces, especially as they manifest themselves in the form of institutions. Investigations are also made of the influence of climate, soil, and topography. History is thus

treated as a description of dynamic society, as the science which appropriates and correlates, with reference to their bearing upon the continuous life of races, the results obtained by the anthropologist, ethnologist, and philologist; by the student of religion, morals and culture, by the political scientist and economist; and, lastly, by the physiographer.

Latin.

The courses at present offered in Latin are nine in number and extend over three years. It is recognized that many students are deficient in preparation and need rigid drill in noun and verb syntax, while there are few to whom this drill is not beneficial. With this thought, the first term's instruction is, as far as needed, grammatical, and prominence is given Latin writing as the very best method of acquiring a mastery of the language.

Ability to read Latin in the Latin order is strenuously insisted on, as inability in this particular is considered one of the chief reasons for the small results that many students secure.

As soon as this preliminary work is done, the attention is directed to two ends: First, to the acquisition of a constantly increasing power to read the language with ease and pleasure. As large a number as possible of representative authors are read. The thought is constantly emphasized that students are not simply reading Latin; they are reading some of the great literary masterpieces of the world, and should enjoy them as such.

A second aim is to introduce the student to the daily life of the Roman; to make his home life vivid, his political life a reality. The contribution of the Roman world to the language, literature, and institutions of our time is so great that an intimate acquaintance with that life is of the highest educational value.

The courses offered include a teachers' seminary. Selections are read from the last six books of Vergil's Aeneid. Discussions and lectures on methods, aims and results in Latin teaching form a part of the work. At intervals, the students take charge of the recitation.

The Latin department is amply supplied with all necessary appliances for the successful prosecution of the work.

Mathematics.

In mathematics is included the entire offering of the University courses in pure mathematics, and in physics and astronomy.

The instruction in pure mathematics comprises three distinct lines of study, differing in extent, in subject matter, and in the method of presentation.

The first is for students in the Colleges of Agriculture, Science and Literature, and occupies two terms, beginning in the fall. It has for its object to promote habits of mental concentration and continuity of thought, to develop the capacity to form and combine abstract conceptions, and to cultivate deductive reasoning. The second line is primarily offered to students in the College of Engineering and occupies two years, also beginning in the fall. In addition to the educational object just given, the purpose is to enable the student to meet the requirements of his engineering studies. The greater part of the time is necessarily taken up with the theory and its applications to geometrical magnitudes.

The third line is presented for students of the Colleges of Science and Literature who wish to advance further in their mathematical work than the engineering student has the time for. It is hoped that this will meet the requirements of those who wish to fit themselves for instructors, and of those who study the science for the love of it.

Parallel with the pure mathematics of the junior and senior years, two lines of associated work in applied mathematics—physical and astronomical—are offered, either of which may be, and one of which must be taken by the student wishing to make mathematics his leading course. One of these lines leads from the physics of the sophomore year through the mathematical theory of electricity and magnetism, heat, light, and sound; and the other through surveying and mechanics to celestial mechanics and to general and mathematical astronomy.

[For fuller information see pp. 58–62.]

Oral Rhetoric.

The main purpose of this course is to teach command of spoken English, and to cultivate rational and effective methods of expression by voice and action. Practical exercises are given for the development of strength, flexibility, and compass of voice, healthful and expressive carriage of the body, and ease and grace of movement. The fundamental aim of the work is to cultivate the ability to analyze, to comprehend, and to appreciate the best thought and to communicate it to others through the most cultured and the truest forms of expression.

For students in the College of Literature, the course covers two years and is divided into (1) Oral Rhetoric, and (2) Oratory.

Oral Rhetoric, or more properly speaking, the Rhetoric of Oral Expression, relates to style in speaking and aims to teach the intelligen the use of voice and gesture in the conveyance of thought to others.

The work in Oratory is an advance upon Oral Rhetoric, leading the student to a knowledge and appreciation of the power of public speech, to acquaintance with the most famous orations, and offering him an opportunity to develop his own ability in this direction.

The art of conversation, extemporaneous speech, and oral composition are studied, and lectures on the essentials of public address and the philosophy of expression are given. The student is required to present original work for criticism as to composition and delivery. Practical drill is given in melody of speech, emphasis, rhythm, inflection, tone projection, and tone color.

For students in the Colleges of Agriculture, Engineering, and Science, a special course of one year is offered. It comprises training in physical presentation and management of the voice, reading from manuscript, memoriter speaking, and extempore address.

To give additional opportunity for the training of individual talent and the higher culture of the speech arts, a course in Elective Expression is offered. It is open to those who have had Oral Rhetoric (1) and (2) or their equivalent. The course includes rendering. impersonation, dialect reading, character sketches, monologues, modern plays, analytic Shakespeare, and dramatic action.

Pedagogy.

The department of Pedagogy aims to offer as much work in the theory and practice of teaching as a specialist in that line can accomplish, in connection with other closely allied subjects, during a period of two years. The work in the class room is mainly a discussion of the purpose of public schools and their means of accomplishing that purpose. By recent action of the trustees of the University a Model School has been established as a part of this department, so that students now enjoy an excellent opportunity for applying the conclusions reached in the class room and for studying children closely. Any students may have the privilege of teaching in this school who are qualified, according to the rules of the University, for the courses in Pedagogy; all such instruction will be under the constant supervision of teachers regularly employed for that purpose. Graduates of the state normal schools of this state are admitted to the course in Pedagogy immediately upon entrance into the University, and satisfactory work during two years will secure for them the University certificate.

Philosophy.

The courses offered comprise the subjects of History of Philosophy, Metaphysics, Ethics, and Logic, and are open to students who have completed at least two years of University work. They are planned to meet the needs of those who make Philosophy their specialty and also of those who desire an acquaintance with the subjects as a means of general culture. It is a constant aim to emphasize the meaning and interest of Philosophy and the relations of its problems to the life of man. The subjects are taught by lectures, recitations, and the seminary method.

Psychology.

The aim of this department is to acquaint the student with the nature of mind, its modes of behavior, the forms under which it manifests itself, and the laws according to which it unfolds and develops. Not only is the normal mind made the subject of thorough study, but also mind in its abnormal phases. The elements of mentality as exhibited in the various animals and in early infant life are investigated with a view to discover the components of adult mental life. The mental make up of the defective and criminal classes is also inquired into in order that light may be thrown upon the social questions as to the best methods to be employed in the treatment of these classes, the best education for the defective, and the best environment for the criminal.

Special attention is given to scientific methods of child study because of the direct and important relations in which the results of such study stand to the various pedagogical theories and the estimate of the educational value of the different subjects taught in our common schools.

The Romance Languages and Literature.

The Romance Language department offers four years of instruction in French, and one year each in Italian and Spanish. In French 1, in Italian, and in Spanish, careful attention is given to pronunciation and to the reading of modern novels and comedies. In French 2, the outlines of the literature of the seventeenth, eighteenth, and nineteenth centuries are studied, while French 3 makes a special study of the origin and development of the drama in France In each class the literature is studied at first hand, the student being required to read the principal masterpieces and to report on them before the class. The instructor endeavors to create an interest in, and an appreciation for, the best works of French literature. In French 4, intended primarily for graduate students, but open to those who have had French 3 or its equivalent,

the attention of the student is directed to the origins of the language, and he is taught the use of scientific methods of original investigation in language and literature. At the Romance Lauguage Club the instructor in charge calls attention to the latest books, articles, reviews, etc., on subjects connected with the Romance languages. The most important Romance articles contained in the contemporary reviews and magazines are reviewed by the students before the Club.

GRADUATE SCHOOL.

The administration of the affairs of this school is placed in the charge of a committee consisting of the Regent of the University and the Deans of the Colleges. Graduates of this University and of other colleges and universities approved by the committee of administration are admitted to the privileges of advanced study and research, upon presentation of their diplomas or other acceptable credentials. Candidates for advanced degrees must register as such, and in each case for the particular degree desired. The application thus made must receive the approval of the administrative committee.

Master's Degree.

A secondary or master's degree will be conferred upon those who satisfactorily pass one full year's work in residence and who present an acceptable thesis. Graduates of this University receive such degree, though non-resident, upon the completion of a prescribed course of study with examination thereon and the presentation of an acceptable thesis. In this case the time required is not less than three years. Each candidate for a master's degree must select one subject as a major, upon which at least one-half the required work is to be done. This subject must be in line with his undergraduate course and the thesis must be based upon the work thus pursued. Two subordinate or minor subjects must also be selected upon which examinations are to be passed. Second degrees must follow in line with the first ones, viz.: A.M. after A.B., M.L. after B.L., or the professional degree of M.E., C.E., etc., M.S. after B.S.

The professors in whose departments the work is taken constitute the committee on examinations, and these must be passed according to the directions of this committee. The thesis should be presented at least one month before the close of the collegiate year.

Doctor's Degree.

The degree of Doctor of Philosophy or Doctor of Science may be conferred upon graduates of this or of any other university or college approved by the committee of administration, after three years of successful graduate study, of which at least the last year or the first two years shall be in residence at this University. These degrees will not, however, be conferred upon the basis alone of the completion of prescribed study for the length of time indicated. Besides this, special attainments must be satisfactorily shown in the power for independent research and of original thought, and the thesis must be a contribution to knowledge.

At least one-half of the prescribed work shall be devoted to the subject chosen as a major, and this work, together with that upon two minor subjects, shall be taken with the approval of the committee of administration, and shall be pursued under the supervision of the heads of the departments to which the subjects severally belong. The examinations shall be conducted as the Faculty of the University direct. At least two months before the close of the collegiate year the candidate shall submit to the Faculty through the professor in charge of his major work a fair copy of his thesis. If the degree is conferred, the recipient thereof shall have his thesis printed and deposit at least fifty copies of it in the office of the Regent of the University.

A Second Bachelor's Degree.

Graduates of this University and of other colleges and universities of equivalent standard may obtain a second bachelor's degree by completing all the subjects regarded as special or technical in the second course and gaining at least nine full term extra credits in addition to those counted for the first degree. A thesis is required, as for first degrees of this rank. Candidates for a second bachelor's degree are registered as resident graduates, but are not enrolled as members of the graduate school.

The amount of instruction in the special subjects required in each of the engineering courses is now so large that little else can be undertaken within the limits of four years. But as higher attainments are reached the more apparent becomes the inter-relations and mutual dependencies between subjects of different courses, and therefore the more desirable is it that a student of any one course should have the chance to gain acquaintance with at least the more closely related branches of an allied course. The above arrangement for a second bachelor's degree, is especially applicable in such cases.

COURSES OF STUDY.

The courses of study in the graduate school will be adapted in each case as nearly as possible to individual wants or requirements. Further information may be obtained by addressing the professor in charge of the department in which the desired work occurs.

In the College of Engineering the following outline of subjects is offered as an aid to candidates for a second or professional degree in the selection of courses of instruction.

For the Degree of Mechanical Engineering (M.E.).

Majors.

1. Advanced Machine Design, 1, 2, or 3 terms,
2. Graphics and Kinematics, 1 term.
3. Mill Engineering, 1 term.
4. Steam Engineering, 1, 2, or 3 terms.
5. Experimental Engineering, 1 term.
6. Thermodynamics, 1 term.
7. Pneumatics, 1 term.
8. Hydraulic Machinery; 1 term.
9. Thesis.

Minors.

1. Mathematics.
2. Physics.
3. Languages.
4. Chemistry.
5. Electrical Engineering.
6. Civil Engineering.
7. Municipal Engineering.
8. Architectural Engineering.

For Degree of Electrical Engineering (E.E.)

Majors.

1. Mathematical Theory of Electricity and Magnetism, 1, 2, or 3 credits.
2. Absolute Measurements in Electricity and Magnetism, 3 credits.
3. Dynamo Electric Machinery, 1, 2, or 3 credits.
4. Electrical Transmission of Power, 1, 2, or 3 credits.

Minors.

1. Economy of Production and Utilization of Electrical Energy, 1 credit.
2. Consulting Engineering, 1 credit.
3. Thermometry and Calorimetry, 1 credit.
4. Photometry, 1 credit.
5. Electro metallurgy, 1 credit.

For Degree of Civil Engineering (C.E).

All majors unless otherwise stated. Each 1 credit.

IN RAILWAY ENGINEERING.

1. Location and construction.
2. Railway Track and Structures, and their Maintenance.
3. Yards and Terminals.
4. Motive Power and Rolling Stock.
5. Signal Engineering.
6. Railway Operation and Management.

BRIDGE ENGINEERING.

7. Bridge Designing.
8. Cantilever and Swing Bridges.
9. Metallic Arches.
10. Metallic Building Construction.
11. Roof Construction.
12. Stereotomy.
13. History of the Development of Bridge Building—Minor.

IN WATER SUPPLY ENGINEERING.

14. Tanks, Stand Pipes, and Reservoirs.
15. Sources and Requirements of Water Supply for a City, and Removal of Impurities.
16. Water Works Management and Economics.
17. Pumps and Pumping.
18. General Water Works Construction.
19. Biological and Chemical Examination of Potable Water.
20. Description of Water Supply Systems—Minor.

IN SEWERAGE.

21. Sewage Purification.
22. Sewage Disposal Works.
23. General Sewerage Design and Construction.
24. City Sanitation.
25. Description of Sewerage Systems—Minor.

IN ROAD ENGINEERING.

26. Economic Aspect of Good Roads and Pavements.
27. Construction of Roads and Pavements.

IN APPLIED MECHANICS.

28. Analytic Mechanics.
29. Resistance of Materials.
30. Hydraulic and Hydraulic Engineering.
31. Laboratory of Applied Mechanics.

MISCELLANEOUS SUBJECTS.

32. Practical Astronomy.
33. Description of Work Done.
34. Critical Description of Engineering Construction.
35. Any Major in Mathematics, Mechanical Engineering, or Electrical Engineering—Minor.
36. Translation of Technical Engineering Work from French or German.

FOR DEGREE OF MASTER OF ARCHITECTURE (M. ARCH).

Majors.

1. Construction of Extensive Wooden Buildings.
2. Recent Uses of Stone, Brick, and Terra Cotta in Architecture.
3. Metallic Skeleton Buildings.
4. Fire-resisting and Fire-proof Buildings.
5. Sanitation of Public and Semi-public Buildings.
6. Researches on the Evolution of Architectural Styles.
7. Higher Application of Graphic Statics.
8. Heating and Ventilation of Large Buildings.
9. Higher Studies in Architectural Design.
10. Researches and Experiments in Applied Esthetics.
11. Translation of an Approved Technical Architectural Work from French or German, original.

Minors.

1. Stereotomy Applied to American Problems.
2. Examinations of Heating and Ventilation of Buildings.
3. Higher Workshop Practice.
4. Photography for Architects.
5. Methods of Reproducing Drawings, Specifications, etc., for Architects.
6. Higher Problems and Methods in Perspective.
7. Practice in Estimates, Specifications, etc., for Large Buildings.
8. Higher Industrial Design.
9. Advanced Water Color Painting.
10. Study of Office Methods and Arrangements.
11. Any Major offered in the College of Engineering.

MATHEMATICS.

1. One term in Bierly's Integral Claculus from page 190 to end; Line, Surface and Space Integrals; Mean Value of Probability; Elliptical Integrals; Theory of Functions; Differential Equations.
2. One term in Elliptical Integrals.
3. One term in Differential Equations.
4. One term in Salmon's Modern Algebra.
5. One term in Salmon's Conics.
6. One term in Salmon's Higher Plane Curves and Solid Geometry.

SUMMER SCHOOL.

PROFESSOR FRANK M. MCMURRY, Director.
PROFESSOR DAVID KINLEY, Assistant Director.

The trustees of the University of Illinois have made arrangements for a summer school, for 1894, to begin June 18th, and to continue for four weeks. Its purpose is the same as that of the University itself, namely, to provide, at slight expense to students, adequate facilities for the study of subjects of common interest and worth. The instruction will be given almost entirely by regular members of the Faculty. A tuition fee of ten dollars will be required for attendance during the entire session. As this source of income cannot defray the expenses of the undertaking, the additional money necessary has been provided for by a liberal appropriation from the trustees of the University. It is, therefore, in no sense a money making enterprise. The subjects of instruction for this first session are as follows: Botany, Chemistry, Economics, English Literature, History, Mathematics, Pedagogics, Physical Culture, Physiology, Psychology and Child Study, Zoölogy.

These courses are open to any persons desiring them, though the hope is that teachers and those preparing to teach will especially avail themselves of the opportunities here offered. Students may devote all of their time to one study or divide it among several of them. Those who have attended the University and wish to make up back work, or to take advanced courses, will receive credit for the same in the records of the University, provided they accomplish at least one full term's work in

any course and pass such examinations upon it as are customary in the department to which it belongs.

The laboratory and other facilities of the University will be utilized to the full extent of the needs of the instruction. In the sciences the courses will mainly consist of laboratory and field work. Students of natural history subjects will have the advantages of a recently established biological station on the Illinois River to which visits can be easily made. In experimental psychology the new laboratory offers special opportunities for the best work of a kind now attracting much attention.

The University library and the special libraries and collections will be open throughout the term.

COURSES OF INSTRUCTION.

Botany.—Mostly laboratory work upon phænogamic and cryptogamic plants, especially structure and physiology. Individual students will, as far as possible, have courses arranged to suit their needs, two to eight hours daily. Field excursions. Miss Alice Barber.

Chemistry.—Largely laboratory work. Four courses as follows: (1) Elementary Chemistry. (2) Qualitative Analysis; Principles and Determinations of constituents of unknown mixtures. (3) Quantitative Analysis; Gravimetric and Volumetric Determinations; Advanced work for those who are prepared for it. (4) Organic Chemistry; Simpler Carbon Compounds with Organic Syntheses; Proximate or Ultimate Analyses. The laboratory will be open eight hours daily. Professor Palmer and Professor Parr.

Economics.—3. Money and Banks. A discussion of monetary and banking principles and history, with special reference to the United States. Professor David Kinley.

English Literature.—The work in this subject will include a threefold course of study. First, a detailed study of some representative author; second, a course in composition; third, a course in advanced grammar and rhetoric. Assistant Professor Katharine Merrill.

History.—1. Civil Government in the United States. A study of the machinery of the national government, of the changes that have been made in it since the beginning, and of the points of departure from the ideal of the framers of the constitution. 2. The Nineteenth Century. This will be mainly a study of the political changes during the century, which have resulted in the increasing spread of democracy. Professor David Kinley.

Mathematics.—Algebra and geometry as required for entrance to the University and any of the University courses in the present catalogue from 1 to 11. Assistant Professor Myers.

Pedagogics.—The general principles underlying method, the changes at present taking place in our public school curriculum, interest and apperception, are some of the topics that will be discussed. Much of the work will be done through round tables, *i.e.*, by informal discussion. Professor C. A. McMurry.

Physical Culture.—The University gymnasium will be available for both men and women, and instruction will be given in the modern scientific methods of physical education, including elementary and advanced work. The regulation suit for women is described elsewhere in this catalogue. Miss Kellogg.

Physiology.—General human physiology with laboratory work Special attention will be given to such class demonstrations as can be made without expensive apparatus. Assistant Professor Summers.

Psychology.—Subjects closely allied to pedagogics—for example, the imagination, memory, thinking. Their bearing on actual teaching will be kept in view. Professor C. A. McMurry.

Psychology and Child-Study.—(1) Experimental psychology, Laboratory demonstrations, and, for advanced workers, special investigations with apparatus and specimens; Lectures upon methods and results· (2) Child-Study. Order of development of mental powers, contents of mind at six years of age, mental economy and waste in school room, adolescence in relation to study, periods of life and growth. Assistant Professor Krohn.

Zoölogy.—For beginners a study of a few common types with dissections and use of microscope. For those specializing in this branch, further studies upon selected types. Advanced students will have special work to meet individual cases.

A special course in entomology, offered because, among other things, insects furnish one of the best opportunities for studies in systematic zoölogy. Assistant Professor Summers.

Suitable accommodations (including both board and room) can be found in either Champaign or Urbana, at prices ranging from $3.50 to $5.50 per week.

Any person desiring to engage board or room, or wishing any further information in regard to the courses offered, should address a letter of inquiry to

F. M. McMURRY, Urbana, Ill.

UNIVERSITY EXTENSION.

The University offers a series of lecture courses by members of the Faculty upon a considerable number of the subjects taught by them. It is an extension of University instruction to people at their homes who cannot attend the institution itself as students, but yet desire the information that such students gain. In the endeavor to make the University doubly useful to the people of the state, the professors hold themselves in readiness to lecture upon invitation in any accessible locality, if consistent with regular duties. The subjects and lectures are the same as at the University, so that there is a real extension of its teaching. The course upon a single subject usually consists of six lectures, one given each week and commonly upon Friday or Saturday evening. For each lecture there is distributed a printed syllabus or outline giving also directions to the best literature upon the subject, and other information. The lectures are preceded or followed by reviews, quizzes, and discussions; and at the end of the course an examination may be held. To those satisfactorily passing such examinations a special certificate is issued in the name of the University, and the proper records are made upon its books.

A special series of lectures has been arranged for teachers' summer institutes. These are not intended to take the place of the ordinary instruction given in such institutes, but to present University subjects by University methods, as far as possible, with all the aids of illustrative and demonstrative equipments.

A special circular giving the subjects and lectures for each academic year is issued during the early autumn and is sent on application.

GENERAL LIST OF SUBJECTS.

This list gives all the subjects and the entire number of courses of instruction offered to students of the University. The several courses are described, and the term or terms, when they are taught, are designated.

When in connection with any course, certain other courses are named under the head of *required*, the course is open to those students only who have already passed satisfactorily in the *required* courses.

The arrangement is by alphabetical order of the chief headings, under which the subordinate divisions, if any, are placed.

COURSES OF INSTRUCTION.

AGRICULTURE.

1. Farm Equipment.—Careful consideration is given to the planning and methods of construction of farm buildings; to the division of the farm into fields; to a comparison of different methods of fencing, with methods of construction and care of each; to laying out, constructing, and maintaining roads. Especial attention is given to the improvement of the farm by drainage; the reasons for drainage, laying out drains, methods of leveling, estimating size of tile, and depth of drains best adapted for different situations being fully explained. Field practice accompanies the class room work. The selection, use, and care of farm implements and machinery receive full consideration. *Lectures and Reference Reading. Fall term, full study.* Professor MORROW.
2. Animal Husbandry.—The leading principles of breeding and the practical methods of feeding and managing farm animals, horses, cattle, sheep, and swine, are discussed. The purpose served by food, and the best methods of feeding for the economical production of meat, dairy products, wool, etc., are explained with free use of the records of practice by successful breeders and feeders in this and other countries. The history, characteristics, and adaptations of all important breeds of farm animals are studied. Students are

given the opportunity of carefully studying animals and judging them with reference to breed characteristics and their adaptations to different uses. Practice is given in study of pedigrees. *Lectures and Reference Reading. Winter term, full study.* Professor MORROW.

3. Rural Economy.—The relation of agriculture to other industries; the advantages and disadvantages of different systems, as stock rearing, dairying, grain farming; of specialties and general farming, and the circumstances which make each desirable, are discussed. The culture of farm crops, cereals, roots, grasses, etc., including choice of varieties, preparation and cultivation of the soil, harvesting and utilization of each, receives as full attention as time permits. *Lectures and Reference Reading. Winter term, full study.* Professor MORROW.

4. History of Agriculture.—The development of agriculture, especially in comparatively recent times and in our own country, is studied with particular reference to the effects of climate, different phases
on and of legislation in advancing or retarding it. The
characteristics of agricultural organizations of various
considered, and a survey is taken of agricultural litera-
es and Reference Reading. Spring term, half study.
RROW.

he object of this study is to enable the student to
nself with some fundamental principles of law and
l laws which most directly affect the farmer. Tenure
laws relating to roads, fences, drainage, etc., as
important parts of commercial law are considered.
erence Reading. Spring term, half study. Professor
MORROW.

ANTHROPOLOGY.

1. Anthropology.—This is at present a minor course in general anthropology, approached from the zoölogical standpoint and based upon the general zoölogy and human physiology required as a precedent. The morphological relationships of man are shown in some detail, his presumed origin and probable phylogeny are discussed, and the recognized races of mankind are distinguished and described. The bearing of general biological laws on the organization and history of man are set forth with special reference to their influence on national and social life, the course concluding with the presentation of points of contact between biological anthropology, as here

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AGRICULTURE.

1. Farm Equipment.—Careful consideration is given to methods of construction of farm buildings; to th farm into fields; to a comparison of different me with methods of construction and care of each; structing, and maintaining roads. Especial atten improvement of the farm by drainage; the rea laying out drains, methods of leveling, estimati depth of drains best adapted for different situations being fully plained. Field practice accompanies the class room work. The selection, use, and care of farm implements and machinery receive full consideration. *Lectures and Reference Reading. Fall term, full study.* Professor MORROW.
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3. Rural Economy.—The relation of agriculture to other industries; the advantages and disadvantages of different systems, as stock rearing, dairying, grain farming; of specialties and general farming, and the circumstances which make each desirable, are discussed. The culture of farm crops, cereals, roots, grasses, etc., including choice of varieties, preparation and cultivation of the soil, harvesting and utilization of each, receives as full attention as time permits. *Lectures and Reference Reading. Winter term, full study.* Professor MORROW.

4. History of Agriculture.—The development of agriculture, especially in comparatively recent times and in our own country, is studied with particular reference to the effects of climate, different phases of civilization and of legislation in advancing or retarding it. The history and characteristics of agricultural organizations of various classes are considered, and a survey is taken of agricultural literature. *Lectures and Reference Reading. Spring term, half study.* Professor MORROW.

5. Rural Law—The object of this study is to enable the student to familiarize himself with some fundamental principles of law and with the special laws which most directly affect the farmer. Tenure of real estate; laws relating to roads, fences, drainage, etc., as well as the most important parts of commercial law are considered. *Lectures and Reference Reading. Spring term, half study.* Professor MORROW.

ANTHROPOLOGY.

1. Anthropology.—This is at present a minor course in general anthropology, approached from the zoölogical standpoint and based upon the general zoölogy and human physiology required as a precedent. The morphological relationships of man are shown in some detail, his presumed origin and probable phylogeny are discussed, and the recognized races of mankind are distinguished and described. The bearing of general biological laws on the organization and history of man are set forth with special reference to their influence on national and social life, the course concluding with the presentation of points of contact between biological anthropology, as here

understood, and the various subjects of the philosophical group. It is taught by lectures and prescribed reading. *Fall term, half study.* Professor FORBES.

Required: Zoölogy 1, 2, 3, or 8, and Physiology 1 or 4.

This course will not be offered during the year 1894–5.

2. Anthropology.—This course considers man as a psychical being. The customs, ceremonies, rites, beliefs and folk-lore, especially of primitive peoples are studied in an historical and comparative way, with reference to the common characteristics and fundamental instincts of the human mind and to the origin and growth of existing customs and social institutions. The work consists in lectures, recitations and the investigation by the student of special subjects *Fall term, half study.* DR. DANIELS.

ARCHITECTURE.

1. Shop Practice D.—To give a practical knowledge of various kinds of work, three terms are devoted to a course of instruction which all architectural students are required to pursue, unless they have previously had equivalent practice and obtained credit therefor.

First Term.—Carpentry and Joinery. Planing flat, square, and octagonal prisms and cylinders; framing with single, double, and oblique tenons; splices, straight and scarfed; miter, lap, and gained joints; through and lap dovetails; moldings, miters, miter-box, and panels.

Second Term.—Turning and Cabinet Making. Glue joints; moldings; inlaying; ornamental veneering; turning cylinders, balusters, ornamental forms, capitals, rosettes, vases, etc.

Third Term.—Construction of portions of buildings or of complete architectural structures at a reduced scale; roof trusses, stairs, frames of wooden buildings, etc., made from drawings. *Fall, winter and spring terms, full study.* Mr. PARKER.

2. Wood Construction. Formulæ and data for computing the dimensions and strengths of columns, rods, beams, girders, etc., of wood or metal are first given and then applied in the solution of numerous examples. The kinds of wood and their uses in construction and decoration, their seasoning, shrinkage, defects, and modes of protection from decay, are next studied. The construction and design of

wooden floors, walls, ceilings, and roofs are then treated, and afterwards, joinery, comprising doors, windows, bays, inside finish, cornices, wainscoting, etc. The construction and design of stairs of the various types terminate the work of the term. About twenty problems are worked out on as many plates by the student. *Ricker's Wood, Stone, Brick, and Metal Construction; Macfarlane's Elementary Mathematical Tables. Fall Term, full study.* Assistant Professor WHITE.

3. Stone, Brick, and Metal Construction. Foundations of stone, brick, concrete, and on piles, are first studied. Then the materials employed in stone masonry, their uses, defects, qualities, and mode of preparation. Kinds of masonry and external finish. Tools and methods of stone cutting. The preparation of working drawings is illustrated by practical applications in the study of the arch, the vault, and the dome. Brick masonry is next examined, with its materials and bonds, and several examples are drawn. The manufacture and refining of cast-iron, and wrought-iron, and steel are then studied, together with the processes of pattern making, molding, casting, refining, rolling, etc., as well as the stock or standard dimensions or sections to be obtained in the market. The special properties and value of each metal in a structure, the designing of a line of columns in a tall mercantile building, and of beams and girders, together with the study of joints and connections completes the work of the term. About twelve problems are drawn on the same number of plates. Same text books as in fall term. *Winter term, full study.* Assistant Professor WHITE and MR. GUNN.

Required: Shop Practice D; General Engineering Drawing 1, 2, 3.

4. Sanitary Construction.—Daily recitations or special lectures, with designs for special problems. The study of plumbing, trap ventilation, removal of wastes, construction of water closets, drains and systems of water supply; sewage disposal. Hot water supply and fixtures in dwellings. *Gerhard's Drainage and Sewerage of Dwellings; Lectures on Sewage Disposal. Spring term, full study.* Assistant Professor WHITE.

Required: Math. 4; Shop Practice D; Physics 1.

5. Roofs.—This term is devoted to the elements of graphic statics, and to the applications of the science in the designing of trussed roofs. The composition and resolution of forces, equilibrium, reactions, moments, bending moments, and shears on beams, center of gravity and moment of inertia of any form of cross sections, are first

examined. The construction of wooden and of metallic roofs is next studied, then the mode of computing permanent and temporary loads on roof trusses, of obtaining end reactions, of drawing strain diagrams, determining sectional dimensions of members, and ending with the designing of joint connections. Numerous problems are solved, five different types of trusses are usually worked out, complete designs and details being made for one of wood and another of iron or steel. *Ricker's Trussed Roofs. Spring term, full study.* Assistant Professor WHITE.

Required: Math. 2, 4, 6, 7, 8, 9; Theoretical and Applied Mechanics, 1, 2; Architecture 2, 3, 4 (except for students in civil, municipal, and mining engineering courses).

6. History of Architecture.—Two terms' work, usually divided at the beginning of the Romanesque style. Commencing with the Egyptian and ending with the Renaissance, a careful study is made of each of the more important styles, successively examining the historical conditions, the local and inherited influences, the structural materials and system, the special ornaments, and the purposes and designs of the buildings, with an examination of a few of the most important typical examples of the styles. Especial attention is given to any ideas that might be useful or suggestive in American work, and to tracing the gradual evolution of architectural forms. This study therefore becomes a very interesting branch of the history of human civilization. References are made to numerous works, especially to Fergusson, Lubke, Durm, Reber, Gailhabaud, etc. *Ricker's Notes on History of Architecture. Fall and winter terms, full study.* Professor RICKER.

Required: Architecture 2, 3, 4.

7. History of Architecture (Details).—Exercises in drawing at large scale the most important details of the Grecian, Roman, Early Christian, Byzantine, Mohammedan, Romanesque, Gothic, and Renaissance styles. *Notes and Sketches. Spring term, full study.* Professor RICKER and MR. GUNN.

Required: Architecture 2, 3, 4, 6, 8, 9, 11, 20.

8. Architectural Drawing (The Orders).—Exercises in drawing the five orders of architecture in general and in detail. Applications to a series of problems requiring the use of the orders in various combinations. *Vignola's Five Orders, Boston edition, with translation. Fall term, full study.* MR. GUNN.

Required: General Engineering Drawing 1, 2, 3; Architecture 2, 3.

9. Architectural Drawing (Methods, Shades and Shadows). The subjects of instruction are the different methods of finishing architectural drawings in line and washes, and the study of shades and shadows, those being so combined to produce the greatest benefit to the student. Penciling, inking, washing, and tinting drawings are practiced, as well as obtaining cast shades and shadows. The single plane method is preferred for this purpose, and is found applicable to most cases. Shades and shadows are found on a capital and base, drawn at large scale. Drawings are finished in ink line and wash, sepia, and other tints. *Notes on Shades and Shadows. Winter term, full study.* Mr. Gunn.

Required: General Engineering Drawing 1, 2, 3; Architecture, **2**, 3.

10. Architectural Drawing (Office Work).—This term is devoted to instruction in the office style of preparing working drawings for a given building. Rough figured sketches are furnished to the student, from which each student makes a set of general and detail drawings in pencil on opaque paper. These are then traced in ink on transparent paper or linen and colored to indicate materials. Especial care is taken to secure neat lettering and accurately figured dimensions. Personal instruction to each member of the class. *Spring term, full study.* Mr. Gunn.

Required: General Engineering Drawing, 1, 2, 3; Architecture, 2, 3, 4

11. Architectural Seminary.—Reports and discussions of original investigations of assigned topics, especially in the History of Architecture; reviews of books; abstracts of current technical journals, and other publications. *One session weekly during junior year.* Professor Ricker.

The seminary equipment will also be used by seniors in the preparation of theses, and by graduates for advanced work.

12. Superintendence, Estimates, and Specifications.—This study comprises several specialties in office work, not otherwise provided for, so far as they can be taught in a professional school. One-third the time is devoted to superintendence, one-half to estimates, and the remainder to specifications, contracts, etc.

Clarke's Building Superintendence is carefully read with daily recitations.

In estimates the purpose of the instruction is to impart a knowledge of the usual methods of measurement of materials and work, the arrangement of computations in proper and convenient order, and an acquaintance with approximate prices of materials and labor,

which vary in different localities. The methods of squaring, cubing, of units, and of quanties, are each employed and illustrated by numerous examples.

In specifications, practice is obtained by writing out a complete set for a house, drawings for which have been previously made by the student.

Dietzgen's Specification Blanks are employed. The standard *Contract of the American Institute of Architects* is used, being first carefully studied, then filled out for the same house. Bids, certificates, and other papers are made out. *Ricker's Notes on Estimates; Wolgemuth's Ready Reckoner. Fall term, full study.* Assistant Professor WHITE.

Required: Architecture 2, 3, 4, 5, 6, 10; Theoretical and Applied Mechanics 1 and 2, or 3 and 4.

13. Heating and Ventilation.—A full knowledge of the scientific theory and of the practice of warming and ventilating buildings is the purpose of this study. Commencing with the fuels and the production of heat, the student passes to the flow of gases through ajutages and pipes, applying these data to the calculation of the dimensions of air ducts and chimneys. The different systems of heating by furnaces, hot water, steam, etc , are next examined, with the details of each. The sources of impurity in the air and the requirements of good ventilation are then considered, with the different methods of ventilation by aspiration, by fans, etc., ending with the study of fans of different types. Numerous problems are given. *Ricker's Notes on Heating and Ventilation; Billings' Ventilation and Heating. Fall term, full study.* Professor RICKER.

Required: Mathematics 2, 4, 6; Architecture 2, 3, 4, 10; Physics 1, 3; Chemistry 1; Theoretical and Applied Mechanics 1 and 2, or 3 and 4.

14. Architectural Perspective.—The theory of perspective is taught, with all labor saving methods of abbreviating the labor, and designing in perspective itself is made a special aim, this power being very useful to a draughtsman in preparing sketches for clients. Methods of diagonals, by triangles, and by coördinates are all used. Problems in angular, parallel, vertical, and curlvilinear perspective, as well as in perspective shades and shadows, are solved, requiring original work as far as possible, so as thoroughly to prepare the student for any kind of work in perspective, instead of restricting him to the study and use of a single system. Six problems are worked

out on as many plates. *Ware's Modern Perspective. Fall term, full study.* Assistant Professor WHITE and MR. GUNN.

Required: General Engineering Drawing 1, 2, 3; Architecture 2, 3, 4, 8, 9, 10, 20.

15. Requirements and Planning of Buildings.—A study of the varied requirements of buildings erected for the more important purposes, with exercises in making sketch plans for selected programs. Block plans, grouping of parts, light courts, communications, economical and durable construction, approximate cost and rentals, etc. *Lectures, with illustrations and references to architectural library and cabinet. Winter term, full study.* Professor RICKER.

Required: Architecture 2, 3, 4, 5, 6, 7, 8, 9, 10, 11, 13.

16. Architectural Designing (Residences).—Practice in design and the study of the requirements of dwellings of moderate size are the objects of the study. Several typical plans are selected as bases, and numerous changes suggested, which usually produce radical changes in the design. The student is also encouraged to make working drawings for actual clients, criticisms and suggestions being freely made to him. The work is limited to residences, since this class of buildings is likely to afford the graduate his first opportunity for independent original work, and practice in satisfying their requirements is considered to be more valuable than the study of theoretical or impossible problems. The designing of a convenient, attractive dwelling, to cost a limited amount, is really a quite difficult problem, requiring more time and thought than any other building of equal cost. *Gibson's Convenient Houses. City and Country Houses. Winter term, full study.* Assistant Professor WHITE.

Required: Architecture 2, 3, 4, 6, 7, 8, 9, 10, 12, 13, 20.

17. Architectural Designing, (Problems) —Since students often find considerable difficulty when commencing to express their ideas in designs, several simple problems are first given, such as a tower, a store with flats over it, a small library, etc , five being studied usually during the term. Each student makes sketches at small scale, which are criticised and modified until approved, then worked out in plans, elevations, and details, one elevation being washed to show color or shade effects. The object is to obtain as much practice in original design as possible; and in the making of rapid and effective sketches, suitable for submission to a client or employer. *Spring term, full study.* Assistant Professor WHITE.

Required: Architecture 2, 3, 4, 6, 7, 8, 9; 10, 12, 13, 20.

18. Esthetics of Architecture.—Subject, the laws of correct design, so far as these may be formulated in words, illustrated by the study of numerous examples. Commences with the study of the nature and mode of working of the different materials used in structural and ornamental purposes, deducing the proper ornamental treatment for each, then taking up the proper decoration of walls, ceilings, and roofs, The general principles of ornamentation are next stated, as applied to flat surfaces and to solids of various shapes. A full study of the various materials used in furniture, art works, etc , is then made, with suggestions of their proper use in the art industries. About twenty problems in original design are worked out on as many plates. *Ricker's (abridged) Translation of Redtenbacher's Architiktonik*; *Meyer's Handbook of Ornaments*. *Spring term, full study*. Professor RICKER.

Required: Architecture 2, 3, 4, 6, 7, 8, 9, 10, 11, 12, 13, 14, 16, 20.

19. Advanced Graphics.—This continues the study of graphic statics, commenced in roofs, with applications to metallic roofs of wide spans, roof trusses, of curved or arched form, and those supported by abutments and also jointed. Spherical and conical trussed domes. Continuous girders are also examined, with the effect of moving loads on girders, the instruction ending with the graphical analysis of the arch, vault, and dome, and of the Gothic system of vault and buttress. Practical applications are made to a series of problems in design for specified cases. *Ricker's Notes on Advanced Graphics. References to the works of Planat, Landsberg, DuBois, Clarke, Ott, Levy, Muller, Breslau, etc., on Graphic Statics. Winter term, full study.* Professor RICKER.

Required: Math. 2, 4, 6; Theoretical and Applied Mechanics 1 and 2, or 3 and 4; Architecture 2, 4, 5.

20. Architect's Course in Artistic Drawing and Modeling. (Required.)—

First term. Principles of free hand drawing and light and shade learned from drawing geometric solids (*a*) in outline; (*b*) in washes of water color; (*c*) in values of charcoal.

Second term. Principles applied by drawing (*a*) groups of common objects, as books, vases, chairs, tables, etc.; (*b*) casts of ornament; (*c*) interiors, as the corner of the room; (*d*) plants and flowers from nature. Special attention is given the work from casts and interiors.

Third term. Rendering perspectives in washes of water color (sepia). Sketching from nature.

Lectures are given throughout the year on design and the historic styles of ornament. Students are required to prepare (*a*) a monograph of the ancient, mediæval, or modern styles; (*b*) original exercises showing principles and methods; (*c*) original exercises employing color.

Lectures on perspective are given the second term, and the problems then worked out are illustrated by sketches from nature made during the third term.

Instruction in pen etching is given throughout the year, but most of the work must be done out of hours. *Gregg's Architectural Rendering in Pen and Ink. Fall, winter, and spring terms, full study.* Professor FREDERICK.

Required: General Engineering Drawing 1.

21. Architect's Advanced Course in Artistic Drawing and Modeling. (Optional.)

First term. Modeling in clay (*a*) details of human face; (*b*) copy of cast of ornament; (*c*) ornament from photograph. Casts are made of (*a*) at least one modeled piece; (*b*) arm, hand, or foot from nature; (*c*) foliage, fruit, or vegetable from nature. One original design required.

Second term. Study of color as a means of exterior and interior decoration, at least one color scheme to be worked out, full size, in tempera colors. In place of this a second term of modeling can be taken.

Third term. Work in water colors, groups, flowers, and perspectives, or sketching from the antique and life. Sketching from nature in color. *Fall, winter, and spring terms, full study.* Professor FREDERICK.

Required: Architecture 20.

ART AND DESIGN.

1. For Special Students of Art and Design.—First year, first term. Principles of free hand drawing learned from drawing geometric solids (*a*) in outline, (*b*) in washes of water color, (*c*) in values of charcoal. *Frederick's Notes on Free Hand Drawing.*

Second term. Principles applied by drawing (*a*) groups of common objects, as books, vases, chairs, tables, etc.; (*b*) casts of ornament; (*c*) interior, as the corner of the room; (*d*) plants and flowers from nature.

Third term. Study of anatomy, using Duval's Artistic Anatomy as text book, and drawing from Rimmer's Art Anatomy and Julien's Etudes D'Aprés l'Antique Also outline drawing from the antique figure, and shaded drawings in charcoal of details of the human figure and animal forms.

Lectures are given throughout the year on design and the historic styles of ornament. Students are required to prepare (*a*) a monograph of the ancient mediaeval or modern styles (*b*) original exercises showing principles and methods, (*c*) original exercises employing color.

Lectures on perspective are given the second term and the problems then worked out are illustrated by sketches from nature made during the third term.

Second year, first term. Modeling in clay (*a*) details of human face, (*b*) copy of cast of ornament, (*c*) ornament from photograph. Casts are made of (*a*) at least one modeled piece, (*b*) arm, hand, or foot from nature, (*c*) foliage, fruit, or vegetable from nature.

Second term. Painting in oil color; (*a*) study in monochrome from still life; (*b*) group, as a study for composition and color.

Third term. Painting in water color: (*a*) group, as a study for composition and color; (*b*) flower and foliage from nature; (*c*) sketching from nature.

Design. (*a*) An original design for capital, panel, or spandrel—modeled and cast. (*b*) An original design for surface decoration in color.

Third year, first term. Advanced work in oil and water color painting, and sketching from nature in color.

Second term. Modeling: (*a*) bas relief from antique figure, (*b*) anatomical rendering of an antique figure, (*c*) bust from the antique, (*d*) portrait head from nature in round or relief.

Third term. (*a*) Shaded study of antique figure. (*b*) Portrait head from nature. (*c*) Sketching from nature in color.

Design. Details comprising the human, animal, plant, and insect forms for the purpose of design, and an original practical design employing part of this material. *Three years, double study.* Professor Frederick.

2. For Students of Design.—First term, same as work in design of course 1; also study of the relation of design to manufacture.

Second term. Study of color as a means of interior and exterior decoration. At least one color scheme to be worked out, full size, in tempera colors.

Third term. Practice in designing in the line of work of which the student wishes to make specialty. *One year, double study.* Professor FREDERICK.

Required: Art and Design, 1, first two years.

4. For students in College of Agriculture, and School of Natural Science.—First term,, same as in course 1. Second term, same as in course 1, except that special attention is given to drawing plant and animal forms from nature. Third term, use of pen and ink and water color in work relating to these courses.

Design, same as in course 1. *One year, full study.* Professor FREDERICK.

5. For Students of Mechanical, Electrical, and Civil Engineering and of Chemistry.—First term, same as in course 1. Second term, same as in course 1, except that special attention is given to drawing details of machinery and chemical apparatus. *Fall and winter terms, full study.* Professor FREDERICK.

6. For Students in College of Literature.—The work in this course is the same as course 1, as far as time will allow, including design. Students are required to attend the lectures of course 7. *One or two years, full study.* Professor FREDERICK.

7. Course in the History of Art.—Lectures with collateral reading. Selections from Ruskin, Sir Joshua Reynolds, Viollet le Duc, Day's Work on Ornament, Penot and Chipiez' and Reber's histories of art, and other works relating to the history and methods of painting, sculpture and architecture.

These lectures are illustrated by several hundred lantern slides, and are open to all students of the department. *One year, once a week.* Professor FREDERICK.

ASTRONOMY.

1. Celestial Mechanics.—This course will include a study in detail of some of the principles and laws of analytical mechanics as applied to the solution of astronomical problems. More specifically, it will consider the following and other similar subjects: motion of a particle in space under the action of central forces; detemination of paths when the laws of force are given; determination of orbits, masses, etc., of the heavenly bodies. So far as is possible all computations are based upon data taken by the student. *Watson's Theoretical Astronomy. Winter term, full study.* Assistant Professor MYERS.

Required: Theoretical and Applied Mechanics 1.

2. Descriptive Astronomy.—For students of the College of Engineering. This course comprises the subject matter of course 1, and, in addition, some of the fundamental principles of celestial mechanics. Astronomy is here taught with a view to its utility rather than as a matter of general information. Students are required to work out problems in latitude and longitude, to deduce from the principles of mechanics formulæ for weighing the masses of the heavenly bodies against each other, to solve problems involving corrections for parallax, refraction, dip of the horizon, and to determine mathematically the distances, dimensions, and orbits of the bodies of the solar system. When favorable weather admits, the equatorial telescope is in use by students, and time is spent in the location and study of the constellations. Students are directed to make readings on astronomical subjects of value to be found in astronomical publications in the library, and are frequently required to recite upon them. Though no attempt is made to teach practical astronomy, which is taught as a specialty in civil engineering, the practical features of descriptive astronomy are kept uppermost in this course. *Young's General Astronomy. Spring term, full study.* Assistant Professor MYERS.

Required: Math. 4; Physics 1, 3; Theoretical and Applied Mechanics 1.

3. Mathematical Astronomy.—This course will be a continuation of the work begun in Celestial Mechanics. Considerable time must be spent in the work of the observatory. Fuller consideration will be given to these topics: the doctrine of the sphere; motions of the heavenly bodies; instrumental adjustments and methods; and various other mathematical practical features of the subject. The aim will be to familiarize the student with the practice and the problems of the working observatory. *Watson's Theoretical Astronomy; Chauvenet's Practical Astronomy; Price's Analytical Mechanics. Fall term, 2 hours per week, winter and spring terms, 3 hours per week. This with Mathematics 16 and 17 constitutes a full study for each term.* Assistant Professor MYERS.

Required: Astronomy 1.

4. Descriptive Astronomy.—For students in Colleges of Agriculture, Science, and Literature. The aim of this course is to supply (1) a general knowledge of the facts of astronomy, (2) a clear conception of the principles underlying them, and (3) an understanding of the methods of arriving at these facts. The subjects considered are the doctrine of the sphere, the heavenly bodies, their nature, dimensions,

characteristics, and the influence they exert upon each other by their attractions, radiation, or any other ascertainable cause. The most important instruments of astronomical research are explained, and during favorable weather, the sun, moon, and planets will be studied with the equatorial telescope. Methods of spectroscopic research are discussed and, as far as possible, illustrated. Illustrative charts and lectures are also occasionally resorted to. *Newcomb and Holden's Astronomy, Advanced Course. Spring term, full study.* Assistant Professor MEYERS.

Required: Math. 3.

BOTANY.

1. Histology, Morphology, and Physiology.—This course extends through one year, beginning in the fall. At first systematic studies are made upon specially difficult natural orders of flowering plants, as Compositæ, Cyperaceæ, and Gramineæ, with attention given to nomenclature and to the principles of classification. After vegetation has been destroyed by frost the remainder of the fall term is devoted to the histology of plants. Students make and study microscopical sections and other preparations, make micro-chemical tests, draw figures, and write descriptive notes. Lectures or text book recitations occur about twice a week.

The morphology and classification of special groups of plants, beginning with the lowest orders, constitute the work of the winter term. Compound microscopes are constantly in use, and the laboratory work is made the basis of instruction, variously aided and extended by the study of the text book and by lectures. Special attention is given to injurious fungi.

The third term is devoted to vegetable physiology, and includes: the extent and causes of the movements of fluids in the tissues; the absorption of nutrient materials, respiration, transpiration, and assimilation; the causes, peculiarities, and results of growth; the relations and effects of external agencies, as heat, light, gravitation; self- and cross-fertilization; variation and heredity; movements and sensitiveness. The instruction is given by lectures and recitations, supplemented by required observations and experimental practice. *Bessey's Botany; Goebel's Outlines of Classification and Special Morphology; Vine's Lectures on Vegetable Physiology. Fall, winter, and spring terms, full study.* Professor BURRILL and MISS BARBER.

Required: Chemistry 1; Art and Design 4.

2. Bacteriology.—Bacteria and allied organisms are now known to play exceedingly important roles in nature, and in the daily life and well being of man. This course is an introduction to existing knowledge upon the subject, and offers instruction in the modern methods of experimentation and research. The laboratory is well equipped for a limited number of students. Only those who can give extra time, when occasion demands, should undertake the work. Lectures and assigned reading accompany the laboratory work. *Fall term, full study.* Professor BURRILL.

Required: Botany 1 or 6; Chemistry 1; Art and Design 4.

3. Systematic Botany.—There is offered in this course an opportunity for advanced work in special groups of cryptogamic plants, to which an introduction is made in the winter term of course 1. The determination and classification of species and studies upon life histories largely occupy the time. The methods of bacteriology are used in the cultivation of fresh material. Students who propose to take the course should give notice of the fact at the beginning of the year or earlier, and should make collections for themselves. Laboratory work constitutes the principal part of the course. *Winter term, full study.* Professor BURRILL.

Required: Botany 1, 2; Chemistry 1; Art and Design 4.

4. Plant Reproduction and Development.—Studies are made upon self- and cross-fertilization, embryology, and development, and upon special topics in physiology. Laboratory work, supplemented by lectures and assigned reading. *Strasburger's Practical Botany; Detmer's Pflanzenphysiologisches Prakticum. Spring term, full study.* Professor BURRILL.

Required: Botany 1; Chemistry 1; Art and Design 4.

5. Investigations and Thesis.—Facilities are offered for original investigations upon selected subjects upon which may be based a thesis required for a degree. Special arrangements should be made with the instructor during the preceding year, or at least not later than the beginning of the year in which the work is to be taken. *Winter and spring terms, full study.* Professor BURRILL.

Required: Botany 1; Chemistry 1; Art and Design 4.

6. General Botany.—This minor course is offered to students who have but a single term of botanical study. An endeavor is made to present a general view of the science and to provide an introduction to modern methods of work. Lectures or recitations, but mostly laboratory and field work. *Spring term, full study.* MISS BARBER.

CHEMISTRY.

1. General and Experimental Chemistry.—This course is intended to serve as an introduction to the subject of chemistry, and is directed chiefly to the fundamental and general principles of the science. The work of the term consists of demonstrations, recitations upon the subject matter of the lectures and upon text book lessons, and of practice in the laboratory. The laboratory work, comprising a series of experiments illustrative of chemical principles and their applications, and involving a consideration of the properties of some of the more important elements and their compounds, serves in part as a preparation for the work of the class room. *Remsen's Introduction to Chemistry. Fall term, full study.* Professor PALMER and Mr. ———

2. Descriptive Inorganic Chemistry.—This course is required of all chemical students. It is mainly devoted to a study of the metallic elements, their classification, compounds, and chemical properties. The work is from lectures and assigned text (no laboratory work). *Three hours per week. Remsen's Advanced Course. Winter and spring terms, half study.* Professor PARR.

Required: Chemistry 1.

3a. Qualitative Analysis.—This course includes a study of salts, their formation, solubilities, chemical reactions, etc. The periodic classification of the elements is made the basis for developing the principles of analysis. The work in the laboratory, after illustrating those principles, is occupied with the determination of base and acid constituents of a given number of unknown substances. *Winter term, laboratory work 2 hours daily, and lectures 3 hours per week, full study.* Professor PARR.

Required: Chemistry 1.

3b. Qualitative Analysis, continued with more complex Substances.—A comparative study of methods, difficult separations, problems in synthesis, etc. *Spring term, laboratory work 3 hours daily, full study.* Professor PARR.

Required: Chemistry 1, 2.

4. Elements of Organic Chemistry.—A course in organic chemistry, provided more especially for students who are not making a specialty of chemistry. The instruction is directed mainly to the consideration of the general characteristics and the mutual relations of some of the most important classes of carbon compounds, and the

course constitutes a general introduction to the principles and the methods of organic chemistry. In the laboratory a few typical substances are prepared. *Remsen's Organic Chemistry. Spring term, full study.* Professor PALMER.

Required: Chemistry 3a.

5a. Quantitative Analysis.—General principles and practice of gravimetric quantitative analysis, beginning with salts of definite composition. The purpose here is to gain facility and accuracy of manipulation together with a knowledge of the principles involved in the best practice. Lectures and assigned text from *Fresenius's Quantitative Analysis* accompanying the laboratory work. *Fall term, full study.* Professor PARR.

Required: Chemistry 3b.

5b. Volumetric Analysis, etc.—Volumetric Analysis, acidimetry, and alkalimetry, iodometry, etc., and electrolysis. *Winter term, full study, laboratory work three hours daily.* Professor PARR.

Required: Chemistry 5a.

5c. Silicate Analysis, etc.—The analysis of feldspars, clays and other complex silicates. *Spring term, laboratory work three hours daily, full study.* Professor PARR.

Required: Chemistry 5a.

6. Technological Chemistry.—It is lecture room work only and comprises a study of technological chemistry as illustrated in those industries having a chemical basis for their principle operations and processes. Much use is made of the journals. *Winter and spring terms, half study. Wagner's Chemical Technology.* Professor PARR.

Required: Chemistry 2, 3b.

7. Advanced General Chemistry.—A course in physical chemistry, consisting mainly of laboratory work. It comprises determinations of vapor density, specific heat, depression of freezing point, elevation of boiling point, and calculation of molecular and atomic weights from the data thus obtained, followed by use of refractometer, polariscope, and other instruments, in detemining such constants as serve in characterization or for quantitative estimation of chemical substances, or which serve as the basis of theoretical generalizations. Occasional lectures and the reading of assigned subjects accompany the laboratory work. *Fall, winter, or spring terms, full study.* Professor PALMER.

Required: Chemistry 2, 5b; Physics 1, 3.

8. Iron and Steel Analysis.—This course is devoted to iron and steel analysis. Methods for determination of all the constituents are studied, including both rapid and standard methods, especial attention being given to technical methods for determination of phosphorus and sulphur. *Fall term, full study.* Mr. White.

Required: Chemistry 5c.

9. Organic Chemistry.—The work of this course consists in the detailed discussion of the characteristics of several of the more typical and simple organic compounds, followed by the briefer consideration of most of the important classes of the derivatives of carbon. The instruction comprises lectures, recitations upon assigned subjects, and laboratory work. *Richter's Organic Chemistry* is used as reference and text book. The laboratory work includes the preparation of organic compounds in accordance with the directions given in the manuals of *Cohen*, *Fischer*, and *Levy*, and the ultimate analysis of several of the finished products. *Winter and spring terms, full study.* Professor Palmer.

Required: Chemistry 2, 5a.

10. Sanitary Analysis.—Chemical examination of potable and mineral waters, Detection and estimation of some of the most important poisons, organic and inorganic, and urinalysis. *Fall term, full study.* Professor Palmer.

Required: Chemistry 5a.

11. Investigations and Thesis.—Candidates for graduation from the chemical courses are required to devote at least three hours per day for two terms to the investigation of some selected chemical subjects the results of which are to be embodied in a thesis. The subject must be announced immediately at the end of the Thanksgiving recess, and between that time and the beginning of the winter term an index to the bibliography of the subject must be prepared and presented to the professor who is in charge of the investigation. In the research work the student is required to make full use of the various sets of journals, not only for the purpose of preparing himself for the experimental portion of the work and arranging a proper introduction to the thesis, but also as an essential means of extending his acquaintance with chemical literature and drill in consultation of works of reference. *Winter and spring terms, full study.* Professors Palmer and Parr.

Required: Chemistry, 13 credits.

12. Theoretical Chemistry.—A course of instruction which includes discussions of the principles and theories of general chemistry. *Ostwald's Outlines of General Chemistry. Winter and spring terms, half study.* Professor PALMER.

Required: Chemistry 5a.

13. Agricultural Chemistry.—A course of lectures upon the chemical principles and processes involved in agriculture, taken conjointly with laboratory practice in analysis of agricultural products and materials. *Winter and spring terms, full study.* Professor ———.

Required: Chemistry 5a.

14. Metallurgy and Assaying.—Especial attention is given to the effects of impurities in ores upon metallurgical processes and finished products. Fuels, refractory materials, and fluxes are described and their value and application explained. A series of models of furnaces and specimens of furnace material and products are used in illustration. Much use is made of publications and any method for setting forth the present practice of actual plants in operation. Assaying is introduced as laboratory work for four or five weeks towards the end of the term, in connection with the study of the metallurgy of lead, silver, and gold ores. Fluxes, reagents, and charges are studied in connection with various typical ores and practice given in the use of the crucible and muffle furnaces and in the manipulations connected with fire assaying. *Fall term, full study.* Professor PARR.

Required: Chemistry 8.

15 Organic Analysis and Pharmaceutical Assaying.—One term's work, mainly devoted to proximate analysis of organic compounds and mixtures of natural occurrence or of other origin. The work is both qualitative and quantitative, and includes determinations of the more important alkaloids, carbohydrates, acids, and other essential constituents of organic substances. *Dragendorff's Plant Analysis; Prescott's Organic Analysis; Allen's Commercial Organic Analysis; Lyon's Pharmaceutical Assaying. Spring term, full study.* Professor PALMER.

Required: Chemistry 9.

16. Engineering Chemistry.—This course, arranged for students in chemical engineering only, deals with boiler waters, scale forming materials, determination of calorific power of coals, volatile material

fixed carbon and ash, technical analysis of furnace gases, examination of lubricants, etc. *Winter term, full study.* Professor PARR.

Required: Chemistry 1.

17. Engineering Chemistry.—This course is designed for students in electrical engineering only. It is devoted to elementary quantitative analysis (including the determination of some simple salts), the volumetric determination of iron, acidimetry, etc. *Spring term, full study.* Professor PARR.

Required: Chemistry 3a.

18. Courses in special advanced work in toxicology, urinalysis, metallurgical chemistry, gas analysis, etc., consisting chiefly of laboratory work, may be arranged for those competent to pursue them. From one to three credits will be allowed in the undergraduate courses for such work. Professors PALMER and PARR.

CIVIL ENGINEERING.

1. Land Surveying.—Areas and distances by chain, compass, and plane table; U. S. public land surveys, including legal points involved in the re-establishment of boundaries, magnetic variation, and determination of true meridian. The students solve numerous problems in the field with instruments. To facilitate practice in surveying, an area has been specially prepared in which the difficulties of plane surveying are presented to the beginner as he is able to meet them, and where he is taught practical methods of overcoming them. All possible distances, directions, areas and elevations are accurately known; and hence the instructor knows beforehand the precise result which the student should obtain. This is an incentive to the student and enables the teacher to show him the degree of accuracy attained, and also to point out errors. *Bellows and Hodgman's Surveyors' Manual, Fall term, full study.* Assistant Professor PENCE.

Required: General Engineering Drawing 1; Math. 4.

2. Topographical Drawing and Surveying.—Topographical drawing is given during the bad weather of the winter term. The student spends about half a term making the standard topographical symbols. During the spring term topographical surveying is taught, in which students solve problems with the plane table and the stadia, and make a topographical survey and plot the notes. This and

course 3 must be taken together. *Winter and spring terms, half study.* Assistant Professor PENCE.

Required: Math. 4; General Engineering Drawing 1, 2, 3; Civil Engineering 1.

3. Transit Surveying and Leveling.—Construction, adjustment, and use of the transit and level; angles, inaccessible distances, and areas with the transit; profiles and contours with the level. Two weeks' time is given to practice in running railroad curves. The department is provided with the instruments necessary for the different branches of engineering field practice, including chains, tapes, compasses, plane tables, stadias, transits, levels, barometers, base rods, and comparing apparatus, sextants, and solar transits. These instruments are in constant use by the students whenever the weather will permit. This and course 2 must be taken together. *Baker's Engineers' Surveying Instruments. Winter and spring terms, half study.* Assistant Professor PENCE.

Required: Math. 4; General Engineering Drawing 1, 2, 3. Civil Engineering 1.

4. Railroad Engineering.—In the field practice the class makes preliminary and location surveys of a line of railroad of sufficient length to secure familiarity with the methods of actual practice. Each student makes a complete set of notes, maps, profiles, calculations, and estimates. In addition to the mathematical theory of curves, turnouts, crossings, and the calculations of earth work, instruction is given by means of text books and lectures on the principles of economic location, particularly the effect of distance, grade, and curve upon operation and maintenance, and of methods of construction, equipment, and maintenance of way. *Godwin's Railroad Engineers' Field-Book. Fall term, full study.* Assistant Professor PENCE.

Required: Math. 4; General Engineering Drawing 1, 2; Civil Engineering 1, 2, 3.

5. Masonry Construction.—Requirements and methods of testing stone, brick, cement, and lime; composition, preparation, and strength of mortar and concrete; classification, construction, strength, cost of stone and brick masonry; foundations under water; theory of stability; cost, etc., of dams, retaining walls, bridge piers, bridge abutments, culverts, and arches. The students have experiments in the testing laboratory, in testing cement, mortar, stone, and

brick. *Baker's Masonry Construction. Fall term, full study.* Professor BAKER.

Required: Math. 2, 4, 6, 7, 8, 9; Theoretical and Applied Mechanics 1, 2; General Engineering Drawing 1, 2.

6. Geodesy.—Geodesy is taught by lectures and assigned reading. Studies are made of the instruments and methods employed in spirit, barometrical, and trigonometrical leveling; the apparatus and methods used in measuring base lines; the location and construction of stations; the method of measuring the angles and reducing the triangulation; the principles of projecting maps; the methods employed in running parallels and meridians. The apparatus consists of a 12-inch alt-azimuth instrument reading to single seconds, a precise level, aneroid and mercurial barometers, three wooden base rods, a comparator, a steel tape with level, thermometer, and spring balance. Problems are solved in barometrical, trigonometrical, and precise leveling, and in reading horizontal angles. *Fall term, half study.* Professor BAKER.

Required: Math. 4; General Engineering Drawing 1, 2, 3; Civil Engineering 1, 3; Descriptive Astronomy 2.

7. Practical Astronomy.—Lectures, recitations, and practice. The object is to familiarize the students with those principles of practical astronomy employed in extended surveying operations, and also to train the student in methods of exact observations. The apparatus consists of an observatory with five isolated stone piers; a 12-inch alt-azimuth instrument reading by micrometers to single seconds, both of altitude and azimuth; an astronomical transit; three chronometers; two sextants; two solar transits; and a set of meteorological instruments. The problems include the adjustments of all the instruments, and the determination of time, latitude, and azimuth by the several methods. *Loomis's Practical Astronomy. Fall term, half study.* Professor BAKER.

Required: Math. 4; General Engineering Drawing 1, 2, 3; Civil Engineering 1, 3; Descriptive Astronomy 2.

8. Bridges.—The instruction in bridges occupies two terms. (1) The first—bridge analysis—is devoted to the calculations of the strains in the various forms of bridge trusses, by algebraic and graphical methods, consideration being given to weights of bridge and train, and force of wind. (2) The second—bridge design—is devoted to designing bridges, proportioning sections, and working out of details. Each student designs and makes a full set of drawings of a

bridge. The apparatus consists of a series of full sized joints and connections of a modern iron railroad bridge, numerous models of bridges, a large collection of drawings, photographs, and lithographs of bridges. *DuBois's Strains in Framed Structures. Winter and spring terms, full study.* Professor BAKER.

Required: Math. 2, 4, 6, 7, 8, 9; General Engineering Drawing 1, 2; Theoretical and Applied Mechanics 1, 2; Architecture 6.

9. Tunneling.—This course, treating of methods of tunneling and mine attack, is given to students of civil engineering. The lectures treat first of the nature and use of explosives, compressed air and power drills. The methods of tunneling are then explained and discussed, with their accompanying methods of timbering and walling. Attention is given to the sinking of shafts for the working of tunnels, or for the purpose of driving. The details of the duties of a tunnel engineer are made as clear and concise as possible. Students are required to make written reports upon the methods employed in particular tunnels. Some time is given in the earlier part of the course to the practice in boring wells, dredging, quarrying, and subaqueous blasting. *Spring term, full study.* Professor BAKER.

Required: Math. 2, 4, 6; General Engineering Drawing 1, 2; Shop Practice A; Mechanical Engineering 4; Chemistry 1; Physics 1.

10. Surveying.—For students in the courses of architecture, architectural engineering, and mechanical engineering. Areas with chain and compass, U.S. public land surveys, and principles of re-establishing corners; use of transit in finding distances, areas, and in laying out buildings; use of the level in finding profiles and contours. *Baker's Engineers' Surveying Instruments. Spring term, full study.* Assistant Professor PENCE.

Required: Math. 4; General Engineering Drawing 1, 3; Physics 1.

11. Structural Details.—A study is made of joints and connections in wood and iron. Special attention is given to faulty methods of construction and to impress upon the student the importance of correctly proportioning the smallest details. Each student makes, preferably during the summer vacation preceding his senior year, a full detailed measurement of a railway or highway bridge, or of a trussed roof. In the class room he makes a drawing of the structure, computes the stresses, and reports upon the efficiency of each detail. *Lectures, reference books and drawings. Winter term, full study.* Professor BAKER.

Economics.

1. Principles of Economics (elementary course).—This course is preliminary to all others, and is given every year. It is based on *Ely's Outlines of Economics and Walker's Political Economy* (advanced). *Fall term, full study.* Professor Kinley.

2. Principles of Economics (advanced course).—This course examines in greater details the principles of the science in its most recent development, and aims to prepare the student for intelligent study of more advanced economic theory and practical economic problems. *Winter term, full study.* Professor Kinley.
   Required: Economics 1.

3. Public Finance.—The historical, comparative, and critical study of the methods and purposes of public expenditure, and of the different sources of revenue, is the purpose of this course. It discusses public debts, also their placement and payment, including refunding and redemption. The course is based on *Bastable's Public Finance. Fall and winter terms, half study.* Professor Kinley.
   Required: Economics 1, 2.

4. State and Local Taxation in the United States.—This course studies taxation in the various states and also in the cities, so far as they present features of special interest. It is based on *Ely's Taxation. Spring term, full study.* Professor Kinley.
   Required: Economics 3.

5. Money.—In this course a study of the history and functions of money is followed by a critical examination of such topics as the theory of prices, bimetallism, government paper issues, etc. *Spring term, full study.* Professor Kinley.
   Required: Economics 1.

6. Sociology.—In this course it is intended to study society in its normal structure. The theories of the nature of society, which have been advanced by various writers, are discussed in the light of the history of social institutions, and an effort is made to formulate some of the laws of social growth. *Fall and winter terms, half study.* Professor Kinley.
   Required: Economics 1.

7. Social Pathology.—This course comprises a somewhat detailed study of the problems of charity and crime, with a consideration of theories and methods of reform. *Spring term, half study.* Professor Kinley.
   Required: Economics 6.

8. Economic Seminary.—Advanced students will be formed into an economic seminary for investigation and the study of current economic literature. No student can be admitted who has not taken at least one full year's work in economics. The seminary will meet once a week for two hours during the year. Professor KINLEY.

In addition to the courses outlined under this head, the following offerings of other departments are accepted for credits in economic and social science for students who have taken Economics 1; Agriculture 4 (History of Agriculture), 5 (Rural Law); Anthropology 1, 2; Horticulture 2 (Forestry); Pedagogy 7 (History of Education); Philosophy 6 (Practical Ethics); Psychology 5, 6; and the courses in history, touching economical questions. Those who desire to take economics 6 and 7 are urged to take either previously or in conjunction with them some work in biology, and at least the Philosophy and Psychology named.

In the year 1895-96, courses 3, 4, 5, 6, and 7 will be replaced with courses on the financial history of the United States, banking, and the theory and practice of foreign and domestic exchange.

ELECTRICAL ENGINEERING.

1. Dynamo-Electric Machinery.—Lectures and Laboratory. Theory, design, classification and tests of dynamo-electric machinery. This course is intended for students in Mechanical Engineering, and for others who need only a superficial acquaintance with dynamos and the necessary testing apparatus. *Spring term, full study.* Mr. ESTY.

Required: Physics 1 and 3.

2. Electromagnetism and Dynamos.—(1) Lectures on the theory and classification of electro magnets and dynamos. (2) Experimental study of electro magnets and direct current dynamos. (3) Electrical designing and draughting. *Spring term, full study.* Professor SHEA, Mr. ESTY, and Mr. SWENSON.

Required: Physics 4.

3. Dynamo-Electric Machinery.—(1) Lectures on theory of dynamo-electric machinery, particularly motors and arc machines. (2) Experimental study of dynamo-electric machinery, particularly motors and arc machines. (3) Electrical designing and draughting. *Fall term, full study.* Professor SHEA, Mr. ESTY, and Mr. SWENSON.

Required: Electrical Engineering 2.

4. Alternating Currents and Alternating Current Machinery.—(1) Lectures on the theory and application of alternating currents. (2) Experimental study of alternating currents and alternating current

machinery. (3) Electrical designing and draughting. *Winter and spring terms, full study.* Professor SHEA, MR. ESTY, MR. SWENSON.
Required: Electrical Engineering 4.

5. Photometry.—Lectures and Laboratory. Study of arc and incandescent lamps in connection with their use in electric lighting. *Winter term, half study.* Mr. SWENSON.
Required: Electrical Engineering 3.

6. Telephony, Telegraphy, and Electric Signaling. Lectures and practice. This course includes the theory of telephone, telegraph, and electric signaling devices, and the construction, protection, and operation of lines. *Winter term, full study.* Mr. ESTY.
Required: Electrical Engineering 3.

7. Electro Metallurgy.—Lectures and Laboratory. Theory of electrolysis and practice in treatment of ores and electrolytic separation and refining of metals. *Winter term, half study.* Mr. ESTY.
Required: Electrical Engineering 3.

8. Lighting Plants.—Lectures, testing and draughting. This course includes the construction and use of arc and incandescent lamps; the methods of wiring for arc and incandescent lighting; rules and regulations, the equipment, and management of electric lighting stations; estimates. *Spring term, full study.* Mr. SWENSON.
Required: Electrical Engineering 4, 5.

9. Electrical Transmission of Power.—Lectures, tests and draughting. This course includes the construction, equipment, and operation of electric railways and stations; the utilization of water power; long distance transmission; applications of electricity in various engineering operations; estimates. *Spring term, full study.* Professor SHEA, Mr. SWENSON.
Required: Electrical Engineering 4 and 5.

10. Seminary.—Critical Discussion of current periodical literature of general physics and applied electricity. Professor SHEA.

ENGLISH.

1. General Survey of English Literature.—*Fall, winter, and spring terms full study.* Assistant Professor KATHARINE MERRILL.

2. Rhetoric and Themes.—For students in College of Literature. *Fall, winter and spring terms, two-fifths study, with Oral Rhetoric and Oratory 1 receives 2 credits.* Assistant Professor KATHARINE MERRILL and Mr. T. A. CLARK.

3. Shakspere.—Two hours a week. Professor Dodge. History of the Drama. One hour a week. Professor Dodge. Prose writers from Johnson to Ruskin. Two hours a week. Assistant Professor Katharine Merrill. *Fall, winter, and spring terms, full study.*
   Required: English 1.

4. Themes.—Two hours a week. Optional course. *Fall, winter, and spring terms, two-fifths study.* Mr. T. A. Clark.
   Required: English 2 or 8.

5. Poetry of the 19th Century.—Three hours a week. Assistant Professor Katharine Merrill. Old and early English. Two hours a week. Professor Dodge. *Fall, winter, and spring terms, full study.*
   Required: English 3; French 1 or German 1.

6. Eighteenth Century Prose.—Fall and winter terms. English Criticism. Spring term, 2 hours a week. Early English continued. Fall term. Chaucer's Canterbury Tales. Winter and spring terms, 3 hours a week. *The whole, a full study.* Professor Dodge.
   Required: English 5; French 1 or German 1.

7. Special Course for Scientific Students.—General Survey of the history of the English language and literature. Fall and winter terms. Study of scientific prose. Spring term. *The whole, a full study.* Professor Dodge.

8. Rhetoric and Themes.—For students in Colleges of Agriculture, Engineering and Science. Three hours a week. *Fall, winter, and spring terms, three-fifths study.* Mr. T. A. Clark.

GENERAL BIOLOGY.

1. General Advanced Biology.—For those who have taken a year's work in either botany or zoölogy, a single term of general biology is arranged and especially commended. It is intended to review, extend, systematize, and unify the student's knowledge of the phenomena, the history, and the laws of life, and of the relations of plant and animal, of living and not living matter, and of biology to the other sciences. It will be taught chiefly as a seminary subject, with occasional lectures and some study of text. It is especially a junior or senior study for students of the school of natural science. *Spring term, full study.* Professor Forbes.

   Required: One year's work in full courses in either Botany or Zoölogy.

GENERAL ENGINEERING DRAWING.

1. Elements of Draughting.—This term's work is designed as a general preparation for draughting in all branches. Its aim is, first, to teach the accurate and intelligent use of instruments and materials; and, second, to start the student upon his work with those neat and orderly habits that are invaluable to the competent draughtsman.

   The instruction is given by lectures and reference to books in the University library. The problems are arranged so as to be of the most practical benefit to the student, and, instead of being copies of similar problems, are designed to throw him upon his own ingenuity in applying his knowledge of principles learned. This work includes geometrical constructions; orthographic, isometric, and cabinet projections of objects from models or given data; drawings finished in line shading and water colors, in all about thirty plates. *Lectures and Blue Prints. Fall term, full study.* Mr. McLane and Mr. Phillips.

2. Descriptive Geometry.—The first term's work in this study includes problems on the point, line, and plane, some of the simpler geometrical solids, and shades and shadows. The second term's work takes up plane, single-curved, double-curved, and warped surfaces; the generation and development of the same; sections and intersections. The application of principles and methods in numerous and varied practical problems is a large part of the work in each term, comprising in all the drawing of about thirty-nine plates. *Church's Descriptive Geometry. Half of winter term, half study; spring term, full study.* Mr. McLane and Mr. Phillips.

   Required: General Engineering Drawing 1.

3. Lettering.—Plain and ornamental alphabets; round and stump writing; titles and title pages. *Winter term, half study.* Mr. McLane and Mr. Phillips.

   Required: General Engineering Drawing 1.

GEOLOGY.

1. Geology, Major Course.—(*a*) Dynamic Geology. The instruction given under this head is intended to familiarize the student with the forces now at work upon and within the earth's crust, modeling its reliefs, producing changes in the structure and composition of its rock masses, and making deposits of minerals and ores. A series of localities is studied in which great surface changes have recently taken place, with a view to ascertaining the character of the forces producing such changes, and the physical evidence of the action of

like forces in the past. The subject is taught by lectures, and is abundantly illustrated by maps, models, charts, and views.

(*b*) Petrographic Geology. The instruction under this topic is given by lectures and laboratory work. The subjects included are the classification of rocks, the methods used in their determination, the conditions governing the formation of each species, the decompositions to which they are liable, and the products of these decompositions. Each student is supplied with a set of blowpipe tools and reagents and a series of hand specimens covering all the common species of rocks.

(*c*) Historical Geology. The work on this subject is substantially an introduction to the history of geology as a science, and the developmental history of the leading geological doctrines. An attempt is also made to trace the history of each geological period, so far as may be done with the data in hand.

(*d*) Paleontology. The scheme of instruction in this subject places before the student the classification adopted for those organic forms occurring as fossils, together with the succession of the various groups that occur in the strata, with the cause, as far as known, for their appearance and disappearance. The student is required to familiarize himself with selected groups of paleozoic fossils, abundant illustrations of which are placed in his hands. The subject is presented in lectures and demonstrations, each group being considered in connection with its nearest living representative.

(*e*) Economic Geology. The final term of this course is devoted to a study of the uses man may make of geologic materials, the conditions under which these materials occur, and the qualities which render them valuable. The instruction is given by lectures, with reference to the various state and government reports, transactions of societies, and monographs in which these subjects are treated, as well as by demonstrations with materials from the collections of the University.

In dynamic and historical geology Geikis's text book is used as a reference book. Petrography is pursued by means of a blue print adaptation of Rosenbusch for the crystalline rocks, and various authors for the fragmental. In paleontology Nicholson and Zittel are used for descriptions of the larger groups, Miller for general distribution, and the various state surveys for species. *Winter, spring, and fall terms, full study.* Professor ROLFE.

Required: Chemistry 3b; Physics 1 and 3, or 2; Mineralogy 1 or 2.

2. Investigations and Thesis.—For students who select a geological thesis guidance and facilities will be afforded for individual investigations in the field and laboratory. *Winter and spring terms, full study.* Professor ROLFE.

   Required: Geology 1.

3. Engineering Geology.—It is the object of this course to bring together those parts of geology which will be of the greatest practical benefit to an engineer. The course will deal mainly with subjects connected with the origin, classification, and transformation of rocks, with the principles which govern the deposition and structure of rock masses; with the conditions under which the useful rocks and minerals occur, and the conditions which make them more or less valuable. The instruction is given by lectures and by demonstrations in the laboratory. *Spring term, full study.* Professor ROLFE.

4. General Geology, Minor Course.—This course includes a selection of such geological facts and theories as should be known to every intelligent person, with such discusssion of them as the time will permit. The subjects treated will be fully illustrated, and opportunity will be afforded for some study of rocks and fossils. *Winter term, full study.* Professor ROLFE.

GERMAN.

There are four years of instruction given in German. The first is devoted to the study of grammar supplemented by readers. In the second a select course of reading is followed with exercises in composition and conversation. In the third the study is conducted in German; the history of literature is studied from a manual and by lectures, accompanied by critical reading of classic and latest authors. The fourth year is primarily intended for graduate work and devoted to the study of Ancient German, the Gothic, Old High German, and Middle High German, with lectures on the literature of these periods, and study of the history of the language.

1. For Students in College of Literature.—Joynes-Meissner's German Grammar; Joynes's German Reader. *Fall, winter, and spring terms, full study.* Professor SNYDER and Assistant Professor ELIZABETH C. COOLEY.

2. For Students in College of Literature.—Reading, composition, and conversation. Harris's German Composition, White's German Prose, and a selection of Classics. Gœthe's Iphigenie, or Hermann

and Dorothea; Schiller's Maria Stuart, Wilhelm Tell, or Jungfrau von Orleans, etc. Also selections of modern prose. Freitag's Aus dem Staate Friedrichs des Grossen; Jensen die Braune Erica; Fouqué's Undine, etc. *Fall, winter, and spring terms, full study.* Professor SNYDER.

Required: German 1.

3. For Students in College of Literature.—The study in this year is conducted in German. History of German Literature, with lectures. Assigned reading and reports thereon. Texts, Bernhardt, Gœthe's Meisterwerke, Lessing's Nathan der Weise, or Minna von Barnhelm; Schiller's Wallenstein; Bucheim's Deutsche Lyrik, and selections from modern authors. *Fall, winter, and spring terms, full study.* Prosessor SNYDER.

Required: German 1, 2.

4. For Students in College of Literature.—Gothic Grammar and Reader (Wright), Old High German Grammar and Reader, Middle High German Grammar and Reader. Lectures on the formative periods of the language and their literature through the year. *Fall, winter, and spring terms, three times a week, full study.* Professor SNYDER.

Required: German 1, 2, 3.

5. Special one year's course for students in Colleges of Agriculture, Engineering, and Science.—Joynes's Shorter German Grammar; Joynes's Reader; Hodges' German Science Reader. *Fall, winter, and spring terms, full study.* Assistant Professor ELIZABETH C. COOLEY and Mr. CARTER.

6. Special Scientific Readings.—Equivalent of German 2 in the winter and spring terms. Gore's Science Readings; Seidensticker's Scientific Monographs; and assigned readings. *Winter and spring terms, full study.* Professor SNYDER and Assistant Professor ELIZABETH C. COOLEY.

GREEK.

1. Selections from Xenophon's Hellenica, with prose composition throughout the term. Studies in syntax will be prosecuted by making a systematic collation of the examples in the text. Library references to important matters, suggested by the narrative read, will be given, and summaries required. *Fall term, full study.* Professor MOSS.

2. Selections from Herodotus, with readings from Thucydides for comparison of style and historic method. Studies in Ionic etymology. Greek prose once a week, with particular reference to the syntax of the verb. *Winter term, full study.* Professor Moss.

   Required: Greek 1.

3. Xenophon's Memorabilia. Lectures upon the work and influence of Socrates as a public teacher, with collateral readings upon assigned topics. Greek prose once a week. *Spring term, full study.* Professor Moss.

   Required: Greek 1, 2.

4. Andocides *De Mysteriis*, with one of the shorter orations of Lysias, and Demosthenes. Comparative syntax of the pieces. The development of oratory among the Greeks, by lectures and library references. *Fall term, full study.* Professor Moss.

   Required: Greek 1, 2, 3.

5. Plato.—One entire dialogue and parts of others. Studies in the rhetoric and idiom of the author. Discussion of his philosophical views, so far as touched in the pieces read, with special reference to their antecedents, *Winter term, full study.* Professor Moss.

   Required: Greek 1, 2, 3, 4.

6. Greek Tragedy.—In 1894-5 Aeschylus' Seven against Thebes and Sophocles' Oedipus at Colonus will be read. Their history and method of production will be studied in connection with the history of the Greek drama, and of the construction of the Greek theatre. *Spring term, full study.* Professor Moss.

   Required: Greek 1, 2, 3, 4, 5.

7. Seminary, based upon Homer. Portions of the text will be assigned to each student to be read and used as a basis for the investigation of special topics. The results of such study will be read before the class, and be discussed and criticised. For the purpose of such study the library is well equipped with books, and the department with various appliances. *Fall term, full study.* Professor Moss.

   Required: Greek 1, 2, 3, 4, 5, 6.

8. Seminary. Continuation of course 7. *Winter term, counts as full study.* Professor Moss.

   Required: Greek 1, 2, 3, 4, 5, 6.

9. Course of semi-weekly lectures upon various phases of old Greek life, political, social, economic, etc. When needful the lectures will be

illustrated by numerous photographs at hand, or by stereopticon views. The class will have readings prescribed, collateral to the subjects treated, which are to be synopsized and presented for criticism. *Spring term.* For those who take the lectures only, *half study*, for others counts as *full study*. Professor Moss.

HISTORY.

The study of history extends through the junior and senior years and includes general history, the history of civilization, and the history of the English and United States constitutions. The work of the two years is intended to be continuous, each term being helped by the one preceding; but the study of the constitutional history of the United States is arranged separately for students who have not had the course in general history. The work of the course is presented by text books, topics and lectures, and it is desired that students should obtain a considerable acquaintance with historical writers as well as facts.

1. General history.—Three terms are given to general history (some previous knowledge of the subject being assumed) in tracing the outlines of the world's progress from the first appearance of civilization. The work is intended to be much more than an outline, however, and cause and effect, the philosophy of history, are carefully looked to as preparing the way for the special study of the history of civilization which follows. *Fall, winter, and spring terms, full study.* Mr. WINSTON.

2. History of Civilization.—In this subject the early state of mankind and the history of progress from that state on through the Greek and Roman periods is presented in lectures, followed by a consideration of the civilization of modern Europe on the basis of Guizot's Lectures. References are made to a considerable range of literature, and essays on various topics are required. *Fall term, full study.* Mr. WINSTON.

   Required: History 1.

3. Constitutional History.—In the first term the time is given to an historical study of the English constitution with special reference to principles and precedents belonging equally to modern England and the United States. In the second term an historical and critical study is made of the constitution of the United States *Winter and spring terms, full study.* Mr. WINSTON.

   Required: History 1.

4. Constitutional History.—For students who have not had the work in general history, a term is arranged giving a brief sketch of the principles of English government, and a study of the constitution of the United States. *Winter term, full study.* Mr. WINSTON.

HORTICULTURE.

1. Fruit Culture.—Orchards, vineyards, small fruit plantations and their products constitute the main subjects of this term's work. Lectures are given upon propagating, planting, and cultivating trees and vines; upon identifying, classifying, and preserving fruits, and upon diseases and remedies. Studies are made upon illustrative material in the laboratory, and visits to the orchards and plantations form a part of the instruction. *Fall term, full study.* Professor BURRILL and Mr. MCCLUER.
2. Forestry.—This course embraces a study of forest trees and their uses, their natural distribution, and their artificial production. The relations of forest and climate are studied, and the general topics of forestry legislation and economy are discussed. *Lectures. Winter term, half study.* Professor BURRILL and Mr. MCCLUER.
3. Plant Houses and House Plants.—This study includes gardening and landscape architecture; the methods of construction, heating and ventilation, and general management of greenhouses, and the study of the kinds, propagation, growth, and care of flowering plants. Each student has practice in propagating by cuttings and otherwise, in potting and shifting, and in care of plants requiring various treatment. Insects and diseases, with remedies, are treated and the means of securing vigor of growth and abundance of flowers are studied and illustrated by practice. *Henderson's Practical Floriculture. Winter term, half study.* Professor BURRILL and Mr. MCCLUER.
4. Gardens.—Kitchen and market gardens are made the first subjects of study, after which ornamental and landscape gardening occupies the time. *Henderson's Gardening for Profit; Long's Ornamental Gardening. Spring term, full study.* Professor BURRILL and Mr. MCCLUER.
5. Elements of Horticulture.—This is a minor course, intended for students who take but one term of horticultural work. The following topics are discussed: Orchard sites; the age of trees to plant. the season to plant; how to plant; what to plant; the management of the soil; pruning and care of trees; gathering and preserving fruit; diseases and injuries; the nursery; ornamental trees and shrubs; flower gardens; vegetable gardens, including propagating beds and

houses; the vineyard and small fruits, and timber tree plantation. Students have instruction and practice in grafting, budding, propagation by cuttings, etc. *Lectures. Fall term, full study.* Professor BURRILL and Mr. MCCLUER.

LATIN.

1. Livy.—Selections from the XXI and XXII books. Hannibal and his contest with the Romans. Sight reading, Eutropius. Prose composition based upon the text of Livy in connected passages. A thorough review of noun and verb syntax. *Fall term, full study.* Professor BARTON.

2. Cicero.—De Amicitia and De Senectute. Prose composition based on the text read. An outline of the philosophical systems then prevalent at Rome. *Winter term, full study.* Professor BARTON.
   Required: Latin 1.

3. Horace.—Selections from the Odes. Roman lyric poetry. *Spring term, full study.* Professor BARTON.
   Required: Latin 1, 2.

4. Cicero.—The First Book of the Tusculan Disputations; extracts from De Natura Deorum. The religious ideas of the Romans. *Fall term, full study.* Professor BARTON.
   Required: Latin 1, 2, 3.

5. Horace.—Selections from the Satires and Epistles. The private life of the Romans. *Winter term, full study.* Professor BARTON.
   Required: Latin 1, 2, 3.

6. Plautus; Terence.—Captivi, or Trinummus; Phormio. Roman Comedy. *Spring term, full study.* Professor BARTON.
   Required: Latin 1, 2, 3.

7. Tacitus.—Agricola; Annals, Selections. *Fall term, full study.* Professor BARTON.
   Required: Latin 1, 2, 3.

8. Juvenal.—Satires. The social condition of Rome. *Winter term, full study.* Professor BARTON.
   Required: Latin 1, 2, 3.

9. *Vergil.*—Teachers' Seminary. Extracts from the last six books of the Aeneid. Matters pertaining to the teaching of Latin are discussed, such as the preparation of the teacher, the conduct of the

recitation, the aim in Latin instruction and the advantages of the study. The students, at intervals, take charge of the class. *Spring term, full study.* Professor BARTON.

Required: Latin 1, 2, 3.

MATHEMATICS.

The instruction offered in pure mathematics constitutes two distinct lines of study differing in extent, partially in subject matter, and in the method of presentation. The first is for students in the Colleges of Agriculture, Science, and Literature, and occupies one year, beginning in the fall. It has for its object to promote habits of mental concentration and continuity of thought, to develop the capacity to form and combine abstract conceptions and to cultivate deductive reasoning. The second is primarily offered to students in the College of Engineering and occupies two years, also beginning in the fall. In addition to the educational object just given, the purpose is to enable the student to meet the requirements of his engineering studies. The greater part of the time is necessarily taken up with the theory and its applications to geometrical magnitudes.

The first line of study includes the courses numbered 1, 3, and 5; the second, courses 2, 4, 6, 7, 8, and 9.

1. Advanced Algebra.—For students in the Colleges of Agriculture, Science, and Literature. Functions and their notations; series and the theories of limits; imaginary quantities; general theory of equations. Topical reviews of all preceding algebraic processes. *Wells's College Algebra. Fall term, full study.* Assistant Professor MYERS.

2. Advanced Algebra.—For students in the College of Engineering. Principles of small practical value are subordinated to those of higher utility. Accuracy and dispatch in the use of principles are continually emphasized. A topical review of principles of elementary algebra is made from time to time. This review is sometimes made by requiring students to solve practical problems illustrative of principles not well understood. Some of the most important subjects in which instruction is given are functions and their notation; the progressions; theory of numbers; permutations and combinations; probabilities; convergency and divergency of series; summation of series; undetermined coefficients; doctrine of limits; logarithms and general theory of equations. *Newcomb's College Algebra. Fall term, full study.* Assistant Professor MYERS.

3. Trigonometry.—For students in the Colleges of Agriculture, Science, and Literature. Trigonometry, plane and spherical; fundamental relations between the trigonometrical functions of an angle or arc; relations between the functions of different angles or arcs; construction and use of tables; solution of triangles; angles as functions of sides, and sides as functions of angles; applications. *Oliver, Wait, and Jones's Trigonometry. Winter term, full study.* Assistant Professor MYERS.

Required: Math. 1.

4. Trigonometry.—For students in College of Engineering. The ratio system is studied chiefly, but the necessary connection between it and the line system is carefully proved and illustrated. Students are frequently required to demonstrate the same proposition, using first the line values, then the ratio value of the functions. The subjects taught are the circular measurement of angles, general formulas of plane and spherical trigonometry, relations between functions of multiples of 90° plus or minus an angle, solution of right and oblique plane triangles, of spherical right and oblique triangles, Napier's rules and analogies, and practical applications of principles to the solution of astronomical problems. Teaching is in part by text book, and in part by assigning principles to be demonstrated and problems to be solved outside of the text book. *Oliver, Wait, and Jones's Trigonometry. Winter term, full study.* Assistant Professor MYERS.

Required: Math. 2.

5. Conic Sections (geometrical method).—Definitions and general properties of the ellipse, hyperbola, and parabola, curvature of the conic sections; elements of analytical geometry. Properties and relations of the point and right line in a plane of the conic sections. *Coffin's Sections and Analytical Geometry. Spring term, full study.* Assistant Professor MYERS.

Required: Math. 1, 3.

6. Analytical Geometry.—The aim is to acquaint the student with analytical methods of investigation and to familiarize him with some of the most recent developments in synthetic geometry; to make him more skillful in the use of algebraic processes, especially as a means of demonstrating geometric properties of loci. Subjects considered are the elementary theory of the point and right line in a plane; use of abbreviated notation; elementary theory of the conic sections,

their equations and properties developed analytically; poles and polars; synthetic geometry of the circle, and the discussion of the general equation of the second degree. *Newcomb's Analytic Geometry. Spring term, full study.* Assistant Professor MYERS.

Required: Math., 2, 4.

7. Differential Calculus.—Variables and functions; limits and infinitesimals; differentials and derivatives; differentiation of explicit functions, implicit functions and functions of several variables; derivatives of higher orders; successive derivatives; developments in series; maxima and minima of functions; indeterminate forms; plane curves, tangents and normals; asymptotes, singular points and curve tracing; theory of envelopes, of curvature, of evolutes and involutes. *Newcomb's Differential and Integral Calculus. Fall term, full study.* Professor SHATTUCK.

Required: Math. 2, 4, 6.

8. Advanced Analytical Geometry—Position and direction in space; the plane; the straight line in space; quadric surfaces.

Modern Geometry.—The principal of duality; the distance ratio; the simi ratio; the anharmonic ratio and properties; projective properties of figures; harmonic points and lines; Pascal's theorom and its correlative; trilinear co-ordinates; line co-ordinates. *Newcomb's Analytical Geometry. Winter term, full study.* Professor SHATTUCK.

Required: Math. 2, 4, 6, 7.

9. Integral Calculus.—Elementary forms of integration; integrals immediately reducible to the elementary forms; integration by rational transformations; integration of irrational algebraic differentials; integration of transcendent functions; definite integrals; successive integration; differentiation under the sign of integration; integration by means of differentiating known integrals; double integrals; triple and multiple integrals; product of two definite integrals.

Rectification and quadrature; the parabola, the ellipse, the cycloid, the Archimedean spiral, the logarithmic spiral, the limniscate, the cycloid, quadrature of surfaces of revolution and of surfaces in general, cubature of volumes; the sphere, the pyramid, the ellipsoid, any solid of revolution, and of volumes in general. *Newcomb's Differential and Integral Calculus; Newcomb's Analytical Geometry. Spring term, full study.* Professor SHATTUCK.

Required: Math. 2, 4, 6, 7, 8.

10. *Theory of Equations.*—The development of the general properties of equations; relations of the roots and coefficients of equations, with applications to symmetric functions; transformation of equations; solution of reciprocal and binomial equations; algebraic solution of cubics and biquadratics; properties of derived functions; the limits and separation of the roots of equations; the solution of numerical equations of the nth degree. *Burnside and Panton's Theory of Equations. Fall term, full study.* Assistant Professor TOWNSEND.

Required: Math. 2, 4.

11. *Theory of Determinants.*—It is designed to give the student a thorough working knowledge of the subject and of its applications. It will, in general, cover the origin and notation of determinants, properties of determinants, determinant minors, multiplication of determinants, determinants of compound systems, determinants of special forms—Jacobians, Hessians, Wronskians—with applications to algebra including linear transformations, and to analytic geometry. *Weld's Theory of Determinants* with selected chapters from *Scott's Theory of Determinants. Winter term, full study.* Assistant Professor TOWNSEND.

Required: Math. 2, 4, 6, 7.

12. *Theory of Invariants.*—The course will cover the general development of the theory of invariants from both the geometric and the algebraic side. Applications of invariants will be made to systems of conics and to higher plane curves. Salmon's Modern Higher Algebra will be followed in part, but frequent use will be made of Gordan's Invariantentheorie. *Spring term, full study.* Assistant Professor TOWNSEND.

Required: Math. 7, 10, 11.

13. *Theory of Functions.*—By way of introduction, considerable attention will be given to the geometric representation of the complex variable, including Argand's diagram, conformal representation, and harmonic ratios, and bilinear transformation. This will be followed by the development of the theory of infinite series, algebraic and transcendental functions, integration of uniform functions. Riemann's surfaces, and so much of elliptic functions as the time will permit. *Harkness and Morley's Theory of Functions. Fall term, full study.* Assistant Professor TOWNSEND.

Required: Math. 8, 9, 12.

4. Method of Least Squares.—The object of this course is to present the fundamental principles of the subject in a manner so plain as to render them intelligible and useful to students of astronomy and engineering. The following subjects will be studied: Law of probability and error, adjustment of observations, precision of observations, independent and conditioned observations, etc. *Merriman's Least Squares. Fall term, three hours per week. This, with Astronomy 3 two hours per week, makes a full study.* Assistant Professor MYERS.

Required: Mathematics 7, 8, 9.

5. Seminary and Thesis.—*Fall, winter, and spring terms, half study.*

6. Differential Equations.—This subject is designed for students in the courses of engineering and mathematics and astronomy. It will embrace the following topics: General linear equations with constant coefficients, special forms of differential equations of higher order, integration of series, etc. *A. R. Forsyth's Differential equations. Winter and spring terms, three hours per week. This, with Astronomy 3 of winter and spring terms, constitutes a full study.* Assistant Professor MYERS.

Required: Math. 7, 8, 9.

7. *Analytic Geometry of Space.*—A general review will be given of the position of the plane and the right line in space and the more general properties of surfaces of the second degree. To this will be added the classification of quadrics, special properties of quadrics, foci and confocal surfaces, general theory of surfaces, curves and developables, families of surfaces, and surfaces of higher orders. *Charles Smith's Solid Geometry, with references to Salmon's Geometry of three Dimensions. Winter term, full study.* Assistant Professor TOWNSEND.

Required: Math. 7, 8, 11.

8. *Higher Plane Curves.*—The course is designed to cover the general properties of Algebraic curves, including the theory of multiple points and tangents, curve tracing, poles and polars, and reciprocal curves; to which will be added envelopes, cubics and quadrics, transcendental curves, transformation of curves, and the general theory of curves. *Salmon's Higher Plane Curves. Spring term, full study.* Assistant Professor TOWNSEND.

Required: Math. 8, 9, 12.

MECHANICAL ENGINEERING.

1. Shop Practice A.—In the shops the students are advanced in the work as fast as their ability will permit. The work, as far as possible, is carried along the same lines as those practiced in our leading commercial shops. The exercises are in general chosen from parts of machines under construction, being carefully graded according to the skill of the student. The policy of the department is to give the student every possible advantage and to teach him to produce accurate work in the shortest possible time.

   Beginning with the care and use of the tools with which he is to work, the student is carried through the various operations of machine shop practice. The following outlines the work in the several shops as laid down for the regular classes, the work of the several terms being subject to transposition.

   First Term, Wood Shop.—Primary exercises relating to the use and care of tools, and the construction of a series of exercises in joint work and turning preparatory to pattern making.

   Second Term, Wood Shop.—The work of this term is devoted largely to the making of patterns and core boxes, particular attention being given to the principles of molding.

   Third Term, Foundry—The student here receives instruction in the management of the cupola and molding, including green and dry sand core making. *Fall, winter, and spring terms, full study.* Mr. CURTISS.

2. Shop Practice B.—First Term, Forge Shop.—Instruction is given in the forging and welding of iron and steel, special attention being given to the forging and tempering of lathe and planer tools, annealing and case hardening.

   Second Term, Machine Shop.—During this term the student receives instruction in chipping, filing, and elementary lathe and planer work.

   Third Term, Machine Shop.—Lathe, planer, drill, shaper, or bench work. *Fall, winter, and spring terms, half study.* Mr. CLARK and Mr. JONES.

3. Shop Practice C and Laboratory.—First Term, Machine Shop.—Lathe, planer, milling machine, grinding machine, or bench work.

   Second Term, Machine Shop.—Advanced work on any of the machines in the shop, or erecting and fitting.

   Third Term, Mechanical Engineering Laboratory.—*Fall, winter, and spring terms, half study.* Assistant Professor VANDERVOORT, Mr. CLARK, Mr. CURTISS, and Mr. JONES.

Elements of Machine Design.—The basis of this work is found in *Klein's Elements of Machine Design*. A series of plates 26x40 inches are constructed, covering a wide range of machine parts. There are 334 formulas, empirical and rational, the use and derivation of which are explained. By means of a large number of practical examples, sufficient drill is obtained in using them to enable the student to make the calculations required when designing such parts of machines as screw threads, nuts and bolts, rivets and riveted joints, keys, connecting rod ends, belts, pulleys, stepped cones, shafts, end and neck journals, pivots, and bearings for rotating pieces. Problems relating to gearing are taken up, such as exact and approximate methods of laying out profiles of teeth, proportions of teeth for strength and durability; circular and diametral pitch; cast and cut gears; sizing of blanks; gear cutters; wooden teeth; spur, bevel, and worm gearing, and proportions of worm gearing for highest efficiency. *Fall, winter, and spring terms, full study.* ——— ———

Required: General Engineering Drawing 1, 2, 3.

Mechanism.—A study of the nature and equivalence of mechanisms. Determination of centrodes. Graphical diagrams of the paths, speeds, and accelerations of important points of familiar mechanisms. Laying out of cams. Analysis of difficult mechanisms. Determination of velocity ratios. Particular attention is paid to problems relating to motions of gearing, steam engine mechanisms, parallel motions of indicators, governors, link motions, valve gears, and indicator riggings. *Fall term, full study.* Professor BRECKENRIDGE.

Required: Math. 2, 4, 6; Mechanical Engineering 1, 2, 4.

Steam Engines and Boilers.—A study of the details of modern engines and boilers and of the principles involved in their construction and operation. Text books used are: *The Steam Engine*, *Holmes*, and *A Treatise on Steam Boilers*, *Wilson-Flather*. *Winter term, full study.* Assistant Professor VANDERVOORT.

Required: Math, 2, 4, 6; Theoretical and Applied Mechanics 1.

Thermodynamics.—The fundamental principles underlying the transformation of heat into work, more especially as exemplified in the steam engine, are carefully studied. Considerable attention is paid to the solution of numerous examples, such as will arise in

steam, air, or gas engineering, as well as drill in the rapid and accurate use of standard steam tables. *Fall term, full study.* Professor BRECKENRIDGE.

Required: Math. 7, 8, 9; Theoretical and Applied Mechanics 1; Physics 1, 3.

8. Mechanics of Machinery.—This is a study of the theoretical principles involved in the construction of such machinery as comes under the head of hoisting apparatus, pumping engines, air compressors, fans, blowers, machinery for transmitting power, locomotives, pile drivers. *Winter and spring terms, full study.* Professor BRECKENRIDGE.

Required: Math. 7, 8, 9; Theoretical and Applied Mechanics 1, 2, 3; Mechanical Engineering 5, 6, 7, 11.

9. Machine Design.—This work follows the design of a high speed steam engine, and comes under two heads:

Advanced Design.—Under this head the work begins with simple machines and extends to more difficult designs as the student progresses. The design of attachments to existing machines, or the complete design of some machine that can be built in the shops, is often a part of this work. Such designs as hoists, pumps, drills, lathes, shapers, water motors, etc., are undertaken and the student is supplied with the same information as he would be in commercial offices for this kind of work.

Original Designs.—In this work the student's previous training in designing is combined with his inventive ability, and often valuable and ingenious work is done. The machines are to be designed for accomplishing a certain prescribed work. Often but a single piece is handed the student, and a machine is required to produce a given number of these pieces per hour.

A large amount of study of existing machines is required. The student is taught to consult the standard works on designing, such as *Unwin, Reuleaux, Klein, Marks, Richards,*, and to use such pocket books as *Nystrom, Haswell, Taschenbuch der Hütte,* etc. *Winter and spring terms, full study.* Professor BRECKENRIDGE.

Required: Math. 7, 8, 9; Theoretical and Applied Mechanics 1, 2, 3; Mechanical Engineering 1 to 8, and 11.

10. Estimates.—Calculations and estimates are made as to the cost of machinery, power, plants, boilers, chimneys, systems of piping, engines and their foundations, different methods of power transmission.

Also forms of contracts and specifications are studied. *Spring term, full study.* ——— ———

Required: Math. 7, 8, 9; Theoretical and Applied Mechanics 1, 2, 3; Mechanical Engineering 1 to 6, 9, 11, 12.

11. Valve Gears and Steam Engine Design.—Under this head the steam engine is carefully studied in all its details. A series of plates are drawn showing for the minimum, average, and maximum horse power the pressure of steam on the piston at all points of the stroke, the pressures at cross head, crank pin, crank shaft at all crank angles; taking into account the forces of inertia combined with the steam pressures—counterbalancing crank disc, weight of fly wheel. Each part of a complete engine is designed, and detailed drawings made and traced so that each member of the class may have a complete set of blue prints.

The work in valve gears will be done partly by recitations and partly by drawing room work. The application of graphical diagrams as an aid in the study and design of valves for engines is carefully brought out. *Fall term, full study.* Assistant Professor VanDervoort.

Required: Math. 7, 8, 9; Theoretical and Applied Mechanics 1, 2; Mechanical Engineering 1 to 7.

12. Mechanical Engineering Laboratory.—This work is a continuation of the work begun during the last term of the junior year. It consists of a study of such instruments as are found in the mechanical engineering laboratory, methods of using and calibrating scales, thermometers, gauges, indicator springs, planimeters, counters, calorimeters, brakes, etc. Experiments are made with engines, pumps, injectors, boilers, motors, etc., to determine under what conditions they may be expected to give a maximum efficiency. A limited amount of commercial testing may be undertaken. Tests of plants in the vicinity are made a feature of this work. Carefully prepared reports are always required. Special investigations and research are undertaken as far as possible. *Fall, winter, and spring terms, full study.* ———————.

Required: Math. 7, 8, 9; Theoretical and Applied Mechanics 1, 2, 3; Mechanical Engineering 1 to 7, 11.

METEOROLOGY.

1. Meteorology.—The study of those atmospheric movements which bring our changes of weather, with their relations to heat, cold

electrical conditions, wind, cloud, barometric pressure, etc., constitutes the work of the first half of the fall term. Abercrombie's Weather is used as an introductory text book; but most of the instruction is given by lectures, the study of charts, and attempts by the student to forecast weather changes. *Fall term, half study.* Professor ROLFE.

Required: Chemistry 3b; Physics 1 or 2.

MILITARY SCIENCE.

1. Drill Regulations.—For all male students. School of the soldier; school of the company in close and in extended order; bayonet exercise. *Fall and winter terms, one-fifth study.* Professor HILLS.

2. Drill Practice.—For all male students. *Six terms, two-fifths study.* Professor HILLS.

3. Recitation and Practice for Military Class.—(*a*) School of the battalion, close and extended order; artillery drill.

(*b*) Ceremonies, review, and inspection; military signaling; sword exercise; artillery drill.

(*c*) Guard, outpost, and picket duty; military signaling; artillery drill.

(*d*) Military administration; reports and returns; theory of fire arms; target practice.

(*e*) Organization of armies; field fortifications; art of war. *Seven terms; recitations, 1 to 2 hours a week; drill, 2 hours a week.* Professor HILLS.

MINERALOGY.

1. Elements of Mineralogy.—The first term's work is intended to be a general introduction to the subject. Instruction is given both by lectures and in the laboratory. In the lectures, which occur on specified days (2 or 3) each week, such subjects as follow are discussed: genesis of minerals; conditions favoring their deposition; origin of the massive and crystalline forms; relationships of minerals, and their classification; the physical properties of minerals; as color, luster, hardness, gravity, streak, etc., with the conditions which may cause these properties to vary; elements of crystallography, etc.

In the laboratory the student is first made acquainted with the simplest trustworthy methods for proving the presence or absence

of the acids and bases. He is then required to determine a large number of species by their physical and chemical properties only. *Fall term.* Professor ROLFE.

Required: Chemistry 4.

2. Crystallographic Mineralogy.—(1) During the second term a careful study of the forms of crystals is made, including the measurement of angles and determination of complex forms. The student is also required to identify many species of minerals by their crystalline forms, and to verify his conclusions by the methods in use during the preceding term.

(2) Optical Mineralogy.—The work of the third term will be devoted to the microscopic determination of rock forming minerals; to the methods for separating the mineral constituents of fine grained rocks, etc., etc. *Winter and spring terms, full study.* Professor ROLFE.

Required: Mineralogy 1.

MUNICIPAL ENGINEERING.

1. Road Engineering.—Instruction is given by means of text books and lectures. In country highways the value and importance of road improvement and the best means of securing it are considered, together with the principles and details of construction of earth, gravel, and macadam roads. In city streets, the methods of construction, cost, durability, and desirability of the various kinds of pavement, and the question of grades, cross sections, methods of assessment of cost, and methods of maintenance and cleaning are treated. *Gilmore's Roads, Streets, and Pavements; Lectures and Reading. Winter term, with Civil Engineering 4, makes a full study.* Professor TALBOT,

Required: Math. 4; General Engineering Drawing 1, 2; Civil Engineering 1, 2, 3, 4.

2. Water Supply Engineering.—This subject is intended to cover the principal features of the construction of water works, including the tests and standards of purity of potable water; the choice of source of supply; the designing of the distribution system, pumps and pumping machinery, reservoirs, stand-pipes, and the filtration of water. *Lectures; Fanning's Water Supply Engineering. Fall term, full study.* Professor TALBOT.

Required: Theoretical and Applied Mechanics 1, 3; Chemistry 1; Mechanical Engineering 6.

3. Sewerage.—The design and methods of construction of sewerage systems for cities, including the following: sanitary necessity of sewerage; water carriage systems, both separate and combined; surveys and general plans; hydraulics of sewers; relation of rainfall to storm water flow, and determination of size and capacity of sewers; house sewage and its removal, form, size, design, and construction of sewers and sewer appurtenances; modern methods of sewage disposal by filtration, chemical precipitation, irrigation, etc., with resultant changes in the sewage; estimates and specifications. *Lectures; Staley and Pierson's Separate System of Sewerage. Winter term, full study.* Professor TALBOT.

Required: Theoretical and Applied Mechanics 1, 3; Chemistry 1.

4. Botany.—This is a study of the lowest orders of plants, including such species as are most commonly met with in microscopical examinations of water, and found associated with putrescent substances. Lectures or recitations and microscopical laboratory work. This is practically the same as the first part of the second term of Botany 1, in College of Science. *Winter term, half study.* Professor BURRILL.

5. Bacteriology.—For students in course in municipal engineering. This course includes the identification and classification of bacteria, and of allied organisms, their relations to health and to disease, the methods of separation and cultivation, and the methods of air and water analysis. The laboratory is furnished with sterilizers, culture ovens, microscopes, etc., and students have abundant opportunity to do practical work. This is at first the same as Bacteriology 1, in the College of Science, but in the latter part of the term special investigations are undertaken by the engineering students. *Fall term, full study.* Professor BURRILL.

Required: Municipal and Sanitary Engineering 4.

MUSIC.

Music is not included in the courses for graduation in any department of the University, but instruction is given to all students who desire to take either vocal or instrumental lessons in connection with their regular work, and to others who register specially for the work of this department. For the latter no entrance conditions are required. For fees see this subject in latter part of this catalogue. Miss KIMBALL

ORAL RHETORIC AND ORATORY.

1. Oral Rhetoric.—(1) Mechanism of voice, breathing, voice building, voice development, articulation, pronunciation, modulation, principles of position and gesture. (2) Reading aloud, thought analysis, prepared reading, sight reading, recitations. *Fall, winter, and spring terms, one hour a week, one-fifth study. With English 2 counts 2 credits.* Miss KELLOGG.
   Required: English 2.

2. Oratory.—(1) Melody of speech, grouping, emphasis, rhythm, inflections. (2) Conversation, extempore speech, analysis, study of orations, original work, philosophy of expression. *Fall, winter, and spring terms, one hour a week, one-fifth study.* Miss KELLOGG.
   Required: English 2; Oral Rhetoric and Oratory 1.

3 For Students in Colleges of Agriculture, Engineering and Science.—A special course of one year is offered. It comprises practical training in physical presentation and the management of the voice. Reading from manuscript, memoriter speaking and extemporaneous address. *Fall, winter, and spring terms, one hour a week, one-fifth study.* Miss KELLOGG.
   Required: English 8.

4. Elective Expression.—(1) Rendering, impersonation, dialect reading, character sketches, modern plays, comedies, Shakspere, dramatic action, pantomime. (2) Public addresses, bible and hymn reading, reading of church service, delivery of sermons, conduct of meetings. *Fall, winter, and spring terms, one hour per week, one-fifth study.* Miss KELLOGG.
   Required: Oral Rhetoric and Oratory 1, 2.

PEDAGOGICS.

1. General Pedagogy.—This course discusses the purpose of the public schools and the means that they furnish for its attainment. The relation of instruction to character, the choice of a course of study, the relation of the branches of instruction to one another, and the general principles which underlie method in the teaching of all subjects are the chief topics for consideration. This course aims to show what is meant by a science of pedagogics, and includes the points usually considered under pedagogical psychology. *Fall and winter terms, full study.* Professor MCMURRY.

2. Special Method.—This course considers how the theory advanced by the course on general pedagogy finds application in the school room. The method of teaching each study will be discussed. In company with the professor of pedagogy the students will visit public schools in the vicinity and compare the observations there made; they will also prepare recitations on definite topics. Both they and the professor of pedagogy will frequently hold recitations in the public schools and receive criticisms on the plan of the recitations and the manner of its execution. The desire here is not only to cause pedagogical principles to be better understood by seeing how they are applied, but to give students much practice in planning and criticising recitations in a scientific manner. *Fall, winter, and spring terms, half study.* Professor McMURRY.

   Required: Pedagogy 1; or taken with Pedagogy 1.

3. Pedagogical Seminary.—The seminary will be simply a round table in which frequently one of the recitations observed in the public school will undergo especially careful criticism. Occasionally an article in some educational journal, a new book on education, or a particularly interesting question in pedagogy will be the subject of discussion. At times the students will be asked to read papers on certain topics, and discussion of the same will follow. *Fall, winter, and spring terms, half study (two hours together).* Professor McMURRY.

   Required: Pedagogy 1; or taken with Pedagogy 1.

4. Philosophy of Education.—In this course portions of Bain's Education as a Science, Spencer's Education, and other well known works on education will be used as a basis and will be supplemented with lectures. *Spring term, full study.* Professor McMURRY.

   Required: Pedagogy 1.

5. School Government.—This subject treats of the government of pupils, punishments, etc., duties of principal and superintendent, their relation to school boards, to parents of pupils and to their assistant teachers. *Spring term, full study.* Professor McMURRY.

6. School Hygiene.—The aim of this course is entirely practical. The endeavor is to enlighten those taking the course upon the best methods to be pursued with reference to the following points pertaining to school buildings: Location, soil, elevation, and surroundings; form of structure, ventilation, heating, lighting, plumbing; equipment, especially furniture; play grounds and apparatus

for physical exercise. The course will be illustrated with views of school buildings that are more or less perfect in their hygienic arrangements, and visits to school houses will be made from time to time. Lectures and assigned readings. *Winter term, full study.* Professor McMURRY.

7. History of Education.—This course consists of a study of Greek ideas in regard to education; the system of education of the middle ages and of modern reformers, such as Comenius, Locke, Rousseau, Basedow, Pestalozzi, Frœbel, etc. *Fall and winter terms, full study.* Professor McMURRY.

Required: Pedagogy 1.

8. Teaching in the Model School.—Teaching in this school will consist of a daily recitation in a single study throughout one term. Arrangements for such instruction will be made with the professor of pedagogy. *Fall, winter, and spring terms, full study.* Professor McMURRY.

Required: Pedagogy 1.

PHARMACY.

1. Pharmacy.—This course is intended to serve as an introduction to the theory and practice of pharmacy.

Instruction consists of lectures and text book work, with recitations upon the history of pharmacopœias, weights and measures, specific gravity and the general operative methods of pharmacy, problems in calculating formulas in parts by weights and percentage strengths, chemical proportions, etc. *Remington's Practice of Pharmacy. Fall term, full study.* Mr. SANDFORD.

2. Pharmaceutical Preparations.—This work consists of practice in manufacturing samples of the various official and unofficial preparations.

The student is not required to prepare a great number of each class, but as it is necessary to have sufficient practice to become expert in the manipulation involved, he is directed to make as many as will accomplish that end. Satisfactory work is required on over one hundred preparations. When this work is completed, it is thought that the field of manufacturing pharmacy will be sufficiently covered to give the student a solid foundation for his future work.

Accompanying the laboratory work is a study of all the official and the important unofficial preparations, recitations from text

books, lectures and laboratory work. *U. S. Pharmacopœia; National Formulary; U. S. and National Dispensatories. Winter and Spring terms, full study.* Mr. SANDFORD.

Required: Chem. 1; Pharmacy 1.

3. Pharmacognosy.—This course is intended to make the student thoroughly acquainted with the chemicals and drugs found in the pharmacy and used by the medical profession. The work begins with comparative studies of the salts, etc., used in medicine and of the methods of readily distinguishing between chemicals of like appearance, at the same time their physiological action, dose, sources, and methods of manufacture are considered in a general way. Following this, the organic materia medica is taken up. A complete study of the animal and vegetable drugs, including a close study of the pharmacopœial, English, and common names. By continued practice at the desks the student becomes familiar with all the roots, leaves, seeds, barks, etc., in use, and by the aid of a lens and pocket knife should be able to recognize any of the substances employed in the practice of pharmacy. *Maisch's Organic Materia Medica: U. S. Pharmacopœia. Fall term, first year; spring term, second year.* Mr. SANDFORD.

4. Pharmaceutical Technology.—The sources, manufacture, uses, etc., of the inorganic and organic substances used in pharmacy. Impurities and means of detecting them. Official standards of purity and strength. Prescription reading and practice. The latinity of prescriptions, study of incompatibilities and rules for dispensing.

Finally a general review of the two year's work in pharmacy to serve in part as a preparation for the examination required by the State Board of Pharmacy for registration as pharmacists. *U. S. and National Dispensatories; U. S. Pharmacopœia; Remington's Practice of Pharmacy. Fall and winter terms, full study.* Mr. SANDFORD.

PHILOSOPHY.

1. Outlines of Philosophy.—The object of this course is to furnish a general introduction to the study of Philosophy. It is designed not only for the students who have a special interest in the subject but also for the benefit of those desiring a general knowledge of Philosophy and who have but a single term for the study. The most important problems of Philosophy are presented in lectures and discussions. Selections from several writers are read. *Fall term, full study.* Dr. DANIELS.

2. Greek Philosophy.—A rapid survey is taken of the development of philosophical thought in Greece, from its beginning through Neo-Platonism. Selections from the writings of Plato and Aristotle are read and discussed. In the Post-Aristotelian philosophy, Stoicism, Epicureanism, and scepticism receive special attention. *Fall term, full study.* Dr. DANIELS.

3. Modern Philosophy.—This course considers the formation and development of the problems and conceptions in philosophy from Descartes to the present time. Selections from the philosophical masterpieces of this period are carefully studied. Special emphasis is laid upon the philosophy of Kant. *Winter and Spring terms, half study.* Dr. DANIELS.

4. Philosophical Seminary.—This course has two objects. A somewhat critical and thorough study of subjects of special prominence in philosophy, e. g., realism, idealism, and theory of knowledge. No text book is used. Topics are assigned and papers, prepared by the students, are read and discussed in the class.

   Acquaintance with current philosophical thought. To this end various articles on different aspects or problems of modern philosophy are read and criticised. *Spring term, half study.* Dr. DANIELS.

5. Advanced Philosophy. The work consists in a critical study of *Lotze's Microcosmus*, together with supplementary readings and discussions upon suggested topics. The course is designed for somewhat advanced students and is open to those who have received at least two credits in philosophy or have done an equivalent amount of work in this department. *Winter and Spring terms, full study.* Dr. DANIELS.

   Required: Philosophy 2, 3.

6. Practical Ethics.—In this course those questions which bear the closest relation to life and conduct are raised and discussed. The duties of the individual, the family, and the state are among the subjects considered. Special subjects in social ethics may be taken up, including the duties of society to the unfortunate and delinquent classes. *Winter term, half study.* Dr. DANIELS.

7. History and Criticism of Ethical Theories.—A careful and historical examination of the various types of ethical theory, including rational, hedonistic, eudemonistic, esthetic, and evolutional ethics. It is designed to make the student as familiar as the time allows with the writings of representative men of the various schools. *Spring term, full study.* Dr. DANIELS.

8. Logic.—This course aims to give a knowledge of the principles of deductive and inductive reasoning. In deductive logic, special attention is given to an analysis of the syllogism and a study of its functions and logical value. In inductive logic, the problem, grounds, and principles of induction are discussed. This study is designed not only to direct the student in practical reasoning and correct thinking, but also to familiarize him with the principles and methods of scientific investigation. *Winter term, full study.* Dr. DANIELS.

PHYSICAL CULTURE FOR WOMEN.

This course furnishes a liberal education of the body according to modern scientific methods. Each student comes under the personal observation of the instructor and is graded for work according to her physical condition. Special attention is given to defects of bodily carriage and movement, and prescriptions of exercises are given for the correction of round shoulders, uneven hips, drooping heads. The training has for its fundamental aims, health, strength muscular flexibility and grace. It is divided into practical and esthetic work, and includes German, French, and Swedish exercises. The Delsarte culture is studied after the practical gymnastic drill is acquired. It is thoroughly taught as the higher use of the muscles, and includes artistic principles in the management of the body.

An outline of two years' work is as follows: Free hand gymnastics, light gymnastics, the day's order, the nine laws of Ling, plain and fancy marching, apparatus work, Delsarte culture, studies in expression and attitude, pantomime.

Every woman student, not physically disqualified, may take this gymnastic drill three times a week for three or six terms, and for this work, satisfactorily performed, one credit or two credits, respectively, are allowed toward graduation from any University course. Attendance and proficiency will be considered in each term's standing, of which records will be made as for other class credits. MISS KELLOGG.

PHYSICS.

1. General Descriptive Physics.—Lectures. This course is designed for those who wish to gain a knowledge of the more important laws and phenomena of physical science, and of the means for exhibiting, studying, and applying such laws and phenomena. It is prescribed

for the students in the College of Engineering. *Three times a week. Fall, winter, and spring terms, two-fifths study.* Professor SHEA.

Required: Math. 3 or 4.

2. Elementary Physical Measurements.—Laboratory. This course is designed for those who wish to become acquainted with the simple methods only for the qualitative and quantitative study of physical phenomena. *Once a week. Fall, winter, and spring terms.* Professor SHEA.

Required: Math. 3 or 4.

3. Advanced Physical Measurements.—Laboratory. This course is designed for those who wish to study quantitatively by the aid of the more accurate scientific methods the chief laws and phenomena of physical science. It is prescribed for students in the College of Engineering, and must be taken by them in same year with Physics 1. *Once a week. Fall, winter, and spring terms, three-fifths study.* Professor SHEA.

Required: Math. 3 or 4.

4. Advanced Electrical Measurements.—Lectures and Laboratory. This course is a discussion of the theory of electricity, particularly with respect to electrical units, and electrical measuring instruments, together with laboratory work in advanced problems in electrical measurements. It is prescribed for students in electrical engineering. *Fall and winter terms, full study.* Professor SHEA, Mr. ESTY, and Mr. SWENSON.

Required: Physics 1 and 3; Math. 7, 8, 9.

5. Mathematical Theory of Electricity and Magnetism.—A general treatment of electrostatics, electro-dynamics, magnetism, and electro-magnetism. *Fall, winter, and spring terms, full study.* Professor SHEA.

Required: Physics 1 and 3; Math. 7, 8, 9.

6. Mathematical Theory of Heat, Light, or Sound.—A general treatment of the more important problems of heat, light, or sound. *Fall, winter, and spring terms, full study.* Professor SHEA.

Required: Physics 3; Math. 7, 8, 9.

PHYSIOLOGY (*Human*).

1. Major Course.—Taking as a basis the knowledge of the structure and physiology of mammals obtained in Zoölogy 1 and 3, there is made a

systematic study of the differences, so far as they are of physiological import, between the anatomy of man and of the type mammal there studied; a more detailed study of the facts and methods of mammalian histology; and finally, with as much fullness as the time will permit, a study of the special physiology of man. In the laboratory work the topics are selected to illustrate so far as possible the different methods of obtaining physiological data. *Winter and spring terms, full study.* Assistant Professor SUMMERS.

Required: Chemistry 4; Zoölogy 3*.

2. Advanced Physiology.—The first term is devoted to a study of the physiology of foods, digestion, and excretion, illustrating the application of chemical principles and methods to physiological research. The second term is given to a study of the blood, the circulation, and the respiration. This involves principally the application of physical methods, and practice in the use of instruments of precision. The third term is occupied with a study of the muscular and nervous systems. *Fall, winter, and spring terms, full study.* Assistant Professor SUMMERS.

Required: Physiology 1; Physics 1.

3. Investigation and Thesis.—An opportunity for original investigation, upon which may be founded the graduating thesis, is offered to students in their senior year. While the instructor will have a general supervision of this work, it is expected that the student will at all times take the initiative, seeking only such information and advice as he would ask of any co-worker in his department of science. *Winter and spring terms, full study.* Assistant Professor SUMMERS.

Required: Physiology 1, 2.

4. Minor Course.—This course is planned for literary students and for students of natural science specializing in other lines. While some attention is paid to all the important processes of the body, especial emphasis is laid upon those facts that serve as a basis for practical hygiene. *Fall term, full study.* Assistant Professor SUMMERS.

Required: Chemistry 1.

POLITICAL SCIENCE.

1. Political Science.—This is a short course in comparative constitutional law and administration, based on the second volume of *Bruges' Political Science and Constitutional Law. Spring term, full study.* Professor KINLEY.

*In 1894-95 a special course in general and vertebrate zoölogy will be given, which will take the place, so far as the requirement for Physiology 1 is concerned, of Zoölogy 3, for those students who have not had the latter.

PSYCHOLOGY.

1. General Psychology.—In this introductory course are considered the more general problems of the mental life of the normal individual, especially those that have a living interest for the student, and find illustration in his every day life. Among the large number of topics discussed the following are the chief: Relation of mental activity to bodily changes, sensation, habit, attention, memory, imagination, association of ideas, reasoning, instinct, emotion, will, localization of cerebral functions, time relations of mental phenomena. The course is amply illustrated by the use of apparatus, charts, prepared tissue, and photographs. Endeavor is made to give the class the more important results of recent researches. A considerable number of the best reference books have been purchased, and all the important psychological journals are taken. *Fall term, full study.* Assistant Professor KROHN.

2. Laboratory Psychology.—This course is made up of lectures and laboratory work, with assigned reading. The class performs a series of about one hundred experiments to illustrate the time relations of mental processes, the influence of mind and body upon each other, and the psychic factors in sensation. The psychological laboratory of the University is already well equipped with apparatus, to which additions are constantly making. The current literature in this field is discussed in class and made the basis of reports and reviews on the part of the students. *Winter and spring terms, half study.* Assistant Professor KROHN.

   Required: Psychology 1.

3. Comparative Psychology.—This course embraces the study of the more elementary mental activities, as manifested in the life of various animals. The object of this course is to trace the development of mind along the animal scale, ranging from the lower forms to the more complex mental phenomena in the conscious life of man. *Romanes and Lloyd-Morgan. Winter term, half study.* Assistant Professor KROHN.

4. Educational Psychology.—In this course are discussed the growth and development of the mind, especially with reference to the first years of childhood. The attempt is made to devise methods by means of which the content of a child's mind may be determined at any period of its development. Thus the various methods of testing

and training the memory, attention, and other mental powers, will be submitted and employed in actual observations, upon which notes will be made for discussion in class. The order in which the various mental capacities unfold will also form an important theme for study. The course is thoroughly practical in its nature. *Krohn's Practical Lessons in Pyschology. Fall term, half study.* Assistant Professor KROHN.

5. Psychology of Crime.—This course consists of a special study of the criminal as a morbid individual in comparison with the normal person. *Spring term, half study.* Assistant Professor KROHN.

   Required: Psychology 1.

6. Psychology of the Abnormal Types.—In this course the following, among other subjects, will be studied: The chief forms of mental disease or types of insanity, the diseases of memory, the diseases of language, the diseases of will, double personality, peculiar dreams, hallucinations, illusions and delusions, and hypnotism. The life of the blind, deaf, and imbecile will be inquired into with a view to determine the best methods of education for these classes. *Winter term, half study.* Assistant Professor KROHN.

   Required: Psychology 1.

7. Advanced Experimental Psychology.—Work in this course is arranged for each student individually, and may involve a systematic review by laboratory methods of some master work in Experimental Psychology, or it may involve original research. The aim is to give treatment to certain special problems, necessitating original research, and the verification of important features in earlier experiments. *Fall, winter, and spring terms, full study.* Assistant Professor KROHN.

   Required: Psychology 1, 2.

8. Psychological Seminary.—The subject and hours to be determined after consultation with those who apply. The work in this course is chiefly in the line of discussion of physiological topics and special investigation, as well as reports on the recent psychological literature. All students pursuing major work in this department are required to take an active part in the seminary during their second year. Assistant Professor KROHN.

ROMANCE LANGUAGES AND LITERATURES.

FRENCH.

1. For Students in College of Literature.—The course begins with a study of grammatical constructions, with exercises in composition

and conversation. Careful attention is given to French pronunciation. Reading of the representative works of modern authors, such as Halévy, George Sand, Jules Verne, Erckmann-Chatrian, and others. *Fall, winter, and spring terms, full study.* Mr. PIATT.

2. For Students in College of Literature.—(1) Rapid reading of the representative novels of Chateaubriand, X. de Maistre, Lamartine, Victor Hugo, George Sand, Balzac, Halévy, Erckmann-Chatrian, and others. (2) Outlines of the French literature of the seventeenth, eighteenth, and nineteenth centuries. *Fall, winter, and spring terms, full study.* Professor BRUNER and Mr. PIATT.

   Required: French 1 or 5.

3. For Students in College of Literature.—(1) Rapid reading of the representative dramas of Corneille, Racine, Molière, Voltaire, Beaumarchais, Victor Hugo, Sandeau, Augier, Dumas, Sardou, and others. (2) Lectures on the origin and development of the French drama. (3) Outlines of the French literature of the Middle Ages and the Renaissance. *Fall, winter, and spring terms, full study.* Professor BRUNER.

   Required: French 2.

4. For Students in College of Literature, but Primarily for Graduate Students.—(1) Old French Readings. Clédat, *Les Auteurs Français du Moyen Age;* Suchier, *Aucassin et Nicolete;* Gautier, *La Chanson de Roland.* (2) Physiological Phonetics, Lectures; Sweet, *A Primer of Phonetics;* Passy, *Les Sons du Français;* Beyer, *Französische Phonetik.* (3) Old French Philology. Lectures on the development of Old French from the Popular Latin; Swan, *Altfranzösische Grammatik. Fall, winter, and spring terms, full study.* Professor BRUNER.

   Required: French 3.

5. For students in Colleges of Agriculture, Engineering, and Science.—This is similar to course 1, but less attention is given to grammar and more to translation from French into English. *Fall, winter, and spring terms, full study.* Mr. PIATT.

ITALIAN.

1. Grandgent's *Italian Grammar;* rapid reading of modern authors; *Dante's Divina Commedia;* outlines of Italian literature. *Fall, winter, and spring terms, full study,* 1894-5. Professor BRUNER.

Spanish.

1. Manning's Spanish Grammar; rapid reading of modern authors; Cervantes' *Don Quijote;* outlines of Spanish literature. *Fall, winter, and spring terms, full study,* 1895-6. Professor Bruner.

THEORETICAL AND APPLIED MECHANICS.

1. Analytical Mechanics.—The mechanics of engineering, rather than that of astronomy and physics, is here considered, with a view to the future needs of the student of engineering. In addition to fixing the fundamental concepts and demonstrating the general principles of equilibrium and motion, application of principles and methods is made to numerous and varied engineering problems in such a way that the student must discriminate in the use of data and in the statement of conditions, and so obtain a working knowledge of the subject. The methods of the calculus are used whenever preferable. As mathematical processes and forms express most readily and quickly the rules and methods of work, the training in this direction is important. This subject requires a thorough working knowledge of the mathematics preceding it in the course.

   Outline of the subject: Nature and measure of force; composition and resolution of forces; moments; conditions of equilibrium; resultant of systems; of forces; center of gravity; moment of inertia; rectilinear and curvilinear motion, and the relation between such motion and the constraining and accelerating forces; dynamics of a rigid body; momentum and impact; work, energy, and power; mechanical advantage; friction. *Bowser's Analytical Mechanics. Fall term, full study.* Professor Talbot.

   Required: Math. 2, 4, 6, 7, 8, 9.

2. Resistance of Materials.—In the treatment of this subject it is the aim to give the student a thorough training in the elementary principles of the mechanics of materials, to follow with such experiments and investigations in the testing laboratory as tend to verify the experimental laws, and to add such problems in ordinary engineering practice as will train the student in the use of his knowledge.

   Outline of the subject: Elasticity of materials; stresses and strains; experimental laws; working strength for different materials; resistance of pipes and riveted joints; bending and resisting moment; shear and elastic curve of cantilever, simple, restrained, and continuous beams; column formulas; torsion. and shafts; maximum internal stresses in beams; fatigue of metals; working strength

for repeated stresses; resilience; reliability of the common theory of flexure, as shown by actual experiment; design and strength of rolled and built beams and columns; specifications for materials and methods of testing. *Merriman's Mechanics of Materials. Winter term, full study.* Professor TALBOT.

Required: Math. 2, 4, 6, 7, 8, 9; Theoretical and Applied Mechanics 1.

3. Hydraulics.—In hydraulics the instruction is by text book and laboratory work.

The subject covers the following: Weight and pressure of water; head; center of pressure; velocity and discharge through orifices, weirs, tubes, pipes, conduits, canals, and rivers; measurement of pressure, velocity, and discharge; motors and meters; water power. *Merriman's Hydraulics. Spring term, full study.* Professor TALBOT.

Required: Math. 2, 4, 6, 7; Theoretical and Applied Mechanics 1, 2.

4. Applied Mechanics.—To be taken instead of Analytical Mechanics. The course of study and topics studied will be nearly identical. *Peck's Elementary Mechanics. Fall term, full study.* Assistant Professor MYERS.

Required: Mathematics 2, 4, 6.

5. Strength of Materials.—To be taken instead of Resistance of Materials. The course of study will be nearly the same, though somewhat simplified. *Merriman's Mechanics of Materials. Winter term, full study.* Assistant Professor MYERS.

Required: Mathematics 2, 4, 6; Theoretical and Applied Mechanics 4.

VETERINARY SCIENCE.

1. Anatomy and Physiology.—The anatomy and physiology of the domestic animals constitute the subjects of instruction for a term. The instruction is given by lectures, aided by demonstrations with use of skeletons and models illustrating the details of structure and formation of parts. This is supplemented by the study of text books. *Strangeway's Veterinary Anatomy; Smith's Physiology of the Domestic Animals. Fall term, full study.* Professor MCINTOSH.

2. Principles and Practice of Veterinary Medicine.—This subject comprises veterinary medicine, surgery, and hygiene, and is taught by lectures and text books, and illustrated by specimens of morbid anatomy, with observations and practice at the clinics. The latter are held at the veterinary infirmary, where a large number of animals are treated or operated upon once each week. Dissections and

post mortems are made. *Williams's Practice of Veterinary Medicine and Surgery; Courtney's Practice of Veterinary Medicine and Surgery. Winter and spring terms, full study.* Professor McINTOSH.

3. Materia Medica.—The substances and agents used for the prevention or cure of disease and for the preservation of health are studied in this course. The instruction is given by lectures and text books. In the illustrative collections are specimens of all the drugs used. *Dun's Veterinary Materia Medica; Wood's Human Materia Medica. Fall, winter, and spring terms, full study.* Professor McINTOSH.

ZOÖLOGY.

1. General Zoölogy, Major Course.—The three terms' work here described forms a continuous course, beginning in the winter term of the freshman year and ending with the fall term of the sophomore year. It is the immediate object of this course to lay the foundation for a working knowledge of zoölogy, and its secondary object to draw from zoölogical science its distinctive discipline as an element in a liberal education. It is planned with a view to giving to students a wide acquaintance with the methods of zoölogical research in field, laboratory, and library, and a general acquaintance with zoölogical theory and the leading facts of observation and experiment upon which such theory rests. It is devoted especially to a series of laboratory studies of animal types, and to lectures on the morphology, physiology, and relations to nature of this selected series. The laboratory work includes dissections of the crayfish and earthworm, serial sections of the latter and of Hydra, and numerous studies and preparations of the Protozoa. Lectures on the structure, physiology, and classification of the Protozoa, their relations to plants and to the organization, embryological development, and history of the higher animals, are made to elucidate and illustrate the general theory of zoölogy, which is here presented in outline to be filled in and completed as the work proceeds. The general zoölogy of the remaining lower invertebrate forms, incluing Vermes, finishes the work of the term.

The second term is devoted to the morphology, physiology, and general classification of the remaining invertebrates, with principal attention to the Arthropoda. It is directed especially towards the entomological course of this department, and is required of all students expecting to take entomology. The laboratory work includes

a study of the embryology of some insect form, and a considerable amount of semi-independent work upon the invertebrate fresh water fauna of the region.

The third term's work is done on vertebrates, with principal attention in the laboratory to anatomical work on the larger animals. The general method of the work is that of comparative anatomy, with special reference to the anatomy of man, this part of the course being directed particularly towards the physiological courses of the University which follow upon it. Philosophical zoölogy takes the form in this term of a course of lectures on the general theory of organic development, illustrated by a systematic study by lectures and reading of the modern doctrine of the descent of man. *Winter, spring* (freshman), *and fall* (sophomore) *terms, full study.* Professor FORBES and Mr. SMITH.

Required: Chemistry 1.

2. This course consists of the first and second terms' work of Zoölogy 1. It will be accepted as major work on the list of restricted electives from those who follow it with Zoölogy 4. *Winter and spring terms, full study.* Professor FORBES and Mr. SMITH.

Required: Chemistry 1.

3. This course consists of the first and third terms' work of course 1. It will be accepted as major work under the list of restricted electives from those who follow it with Physiology 1. *Winter and fall terms, full study.* Professor FORBES and Mr. SMITH.

Required: Chemistry 1.

4. Entomology.—This course of two terms should be taken by preference in the sophomore year. It is practically a sequel to course 2 in general zoölogy, the work of the second term of that course being directed especially towards entomology.

Presuming upon a general knowledge of the Arthropoda, the instruction begins with more detailed work on Insecta. The greater part of the course consists of laboratory studies of the structure and classification of insects; practice in the determination of species and the description and illustration of species and structures; field work and observation, including the collection of specimens of all orders and stages, aquatic and terrestrial; office work in the preparation, labeling, and arrangement of collections; a systematic independent study of life histories of selected species. with full records, descriptions, and drawings; experimental insecticide work; and library practice in the collection, collation, indexing, and abstracting of the literature of the species principally studied; concluding with a

thesis on a single species studied both biologically and experimentally. Special instruction is given in this course in the art of entomological illustration, under the supervision of an expert natural history artist.

It is intended that the student shall come through this course accomplished in all the methods of the zoölogical laboratory as applied to entomology, competent to determine, to draw, and to describe species, and experienced in the various operations of field, laboratory, library, and economic entomology. *Winter and spring terms, full study.* Professor FORBES and Mr. JOHNSON.

Required: Zoölogy 1 or 2.

5. Embryology.—A course in comparative vertebrate embryology is offered in the winter term. The laboratory work will be chiefly devoted to the practical study of the development of the chick. The student will become familiar with approved methods of sectioning, reconstruction from sections, and other means of embryological study. The more general features of vertebrate embryology will be covered by lectures and required reading. *Winter term, full study.* Mr. SMITH.

Required: Zoölogy 1, 2, or 3.

6. Advanced Zoölogy.—To students who have had course 1, 2, or 3, an opportunity is offered for a year's work, two hours a day, in advanced zoölogy, to be taken individually under the guidance of an instructor. It may be closely adapted to the bent and ability of the student. Three main lines of work will, however, be especially provided for: (1) Systematic zoölogy (including paleontology), with field and laboratory work in the collection, determination, and description of species; (2) œcological studies with a basis in field observations and laboratory experimentation; (3) comparative anatomy and embryology, or other morphological work. A full study of the theory of development, with application in detail to the genealogy of some group of animals is recommended for all students in this course.

Very unusual facilities for the work of this year are at hand in the library and collections of the State Laboratory of Natural History, which occupy rooms convenient to those of the zoölogical department of the University. *Fall, winter, and spring terms, full study.* Professor FORBES.

Required: Zoölogy 1, 2, or 3.

7. Thesis Investigation.—Candidates for graduation in the College of Science who select a zoölogical subject as a thesis are required to spend at least two hours a day for the winter and spring terms of their senior year in making an independent investigation of some selected zoölogical subject. While this work is done under the general supervision of an instructor, it is in its methods and responsibilities essentially original work. *Winter and spring terms, full study.* Professor FORBES.

   Required: Zoölogy 1, 2 and 4; or 3 and 5.

8. General Zoölogy, Minor Course.—For the benefit of students of natural science specializing in some other direction, as well as for literary students desiring some general knowledge of zoölogy, a course of a single term is offered which contains enough laboratory and descriptive work to give a practical idea of the method of zoölogical science, and a sufficient number of lectures, with study of text, to cover the general subject in a cursory manner. Principal attention is paid to the Protozoa, to insects, and to birds. *Winter term, full study.* Mr. SMITH.

PRIZES AND SCHOLARSHIPS.

THE HAZLETON PRIZE MEDAL.

Capt. W. C. Hazleton provided a medal, of beautiful and artistic design, which is to be awarded at a competitive drill to be held near the close of the year, to the best drilled student. Each competitor must have been in attendance at the University for at least sixteen weeks of the current college year; must not have had more than four unexcused absences from drill; and must present himself for competition in full uniform.

The award will be made on the following points:

1. Erectness of carriage, military appearance, and neatness.
2. Execution of the school of the soldier, without arms.
3. Manual of arms, with and without numbers.

The successful competitor will receive a certificate setting forth the facts, and may wear the medal until the 15th day of May following, when it will be returned for the next competition.

HONORARY SCHOLARSHIPS.

Provision has been made for one honorary scholarship for each county in the state. The holder of the scholarship may attend the University for four years, under proper regulations, free of charge for tuition or incidental expenses. The total value of this scholarship in $90.

Several of these scholarships are already occupied. The vacancies in other counties will be filled as follows.

Examinations are to be held in the several counties, under the supervision of the county superintendents thereof, on the second Friday and Saturday of June, at such places as the superintendents may select. Candidates for the examination must be approved in the common English branches by the superintendents. Questions will be furnished from the University, and the answers, in writing, will be sent to the University for judgment. The scholarship will be awarded to the candidate who passes the best examination, provided he has a standing in each subject of not less than 75, and an average standing on all the subjects of not less than 80 per cent.

Each pupil who enters the examination may choose whether he will be examined to enter upon a course in the Colleges of Agriculture, Engineering, or Science, or one of the courses in the College of Literature.

In the first case, the subjects of his examination will be algebra, geometry, physiology, botany, natural philosophy, and English rhetoric and composition.

In the second case, the subjects will be as above, three books of Cæsar, five orations of Cicero, and six books of the Aeneid.

The two classes of examinations are intended to conform to the requirements stated under the head, *Examinations for Admission*, p. 153. It is essential that the examinations in the counties be held at the time named above, publicly, and with reasonable notice; requests for special or private examinations cannot be considered.

ACCREDITED SCHOOL SCHOLARSHIPS.

Scholarships in the University are offered to high schools on its accredited list, one a year to each school, upon the same terms and sub-

ject to the same conditions as the HONORARY SCHOLARSHIPS heretofore established, *except as noted below:*

1. Examinations for the *accredited school scholarships* will be held at the several accredited schools, by the principals thereof, on the third Thursday and Friday in May.

2. There need be no advertisement of the examination, further than by principals to all pupils eligible to pass the same.

3. The term of each scholarship will be for the two school years next after the examination upon which it was awarded, and vacancies will not be filled, except that if any person to whom a scholarship has been awarded shall be unable to accept the same, then the next highest in the competition may be awarded the scholarship.

4. Scholarships will be awarded on these examinations to such persons only as shall be full graduates of their several accredited schools, either of the current or some preceding year.

CHICAGO CLUB LOAN FUND.

The CHICAGO CLUB OF THE UNIVERSITY OF ILLINOIS offers two loans of $250.00 each, payable to the beneficiary, $100.00 the first year, $75.00 the second year, $50.00 the third year, and $25.00 the fourth year. The loans are offered to residents of Cook County, Illinois, only, and are to be awarded upon competitive examination to those obtaining the highest average grades. The loans are due six years after matriculation. They bear no interest while the student is in school, but six per cent after graduation. The examination questions are prepared at the University and cover the same subjects as those for the honorary scholarships.

MILITARY SCHOLARSHIPS.

Students who have gained six term credits in class room military instruction and six such credits in drill practice are eligible for appointment as commissioned officers of the battalion. Those attaining this rank may have awarded them special scholarships, good for one year and equal in value to the University term fees for the same length of time.

FELLOWSHIPS.

The University offers four fellowships, open to graduates of this or other similar institutions, conditioned upon required qualifications and a designated amount of service to the University. Each fellowship is good for one year and has a money value of $400.00, payable in ten monthly installments. Appointments to these fellowships are made upon the grounds of good character, high attainments, promise of distinguished success in the line of studies chosen, and of usefulness to the University. The holders of the fellowships are required to give instruction in assigned subjects 5 to 10 hours a week during the year. The time remaining is to be devoted to graduate study, and fellows are enrolled as members of the graduate school. Advanced degrees are open to them as to other members of this school.

SOCIETIES.

The Literary Societies have from the opening of the University enjoyed its fostering care.

The ADELPHIC and PHILOMATHEAN societies, for men, and the ALETHENAI, for women, occupy spacious halls, which the members have furnished and decorated with taste and elegance. Meetings are held Friday evenings throughout the term time, are well attended, and are maintained with unflagging interest. They furnish excellent drill in writing, speaking, and parliamentary methods.

Both the YOUNG MEN'S and YOUNG WOMEN'S CHRISTIAN ASSOCIATIONS are active and useful organizations and have a large membership.

Subscriptions have been made by students and graduates, amounting to about $15,000.00 towards a new building for these organizations. A canvass has been started outside with the hope of raising the sum to $35,000.00. If this is successful the building will be begun at once. An excellent site has been purchased.

Special organizations unite the students of NATURAL HISTORY, of CIVIL ENGINEERING, of MECHANICAL ENGINEERING, of ARCHITECTURE, of AGRICULTURE, and of CHEMISTRY, and in ATHLETICS.

REGULATIONS AND ADMINISTRATION.

ADMISSION.

[For further information than is here given address W. L. Pillsbury, Registrar, Urbana, Ill.]

Examinations of candidates for admission to the University, or to any of its departments, are held at the University Thursday, Friday, and Saturday before the beginning of the fall term in September and on the two days previous to the opening of each of the other terms, and at other times and places specially announced.

Applicants must be at least sixteen years of age, and it is considered desirable that they be two to three years older than this. They must pass the required examinations, and must pay the prescribed fees. No distinction is made in regard to sex, nativity, color, or place of residence. Entrance may be made at any time, provided the candidate is competent to take up the work of the classes then in progress; but it is very much better to begin upon the first collegiate day in September, when a large number of the classes are organized, several of them to continue during the year. Satisfactory entrance may usually be made at the beginning of the winter term.

The engineer and architect should be adepts in the various departments of drawing, and some previous study of this branch will be of great advantage. Faunce's Mechanical Drawing is recommended as a text book, and the drawings should be made on smooth paper, eight by ten inches, then inked properly.

ENTRANCE EXAMINATIONS.

The subjects upon which entrance examinations are held are numbered and described in the list given below. Those required for the several colleges and courses are designated by the groups of numbers corresponding to the subjects in the list. The physics, physiology and botany described are each required as preparatory to these subjects as taught in this University. The text books are named only to aid in showing the requirements. Equivalents are accepted,

1. For the Preparatory Classes.—Subjects 1, 2, 3, 4.

2. For the Colleges of Agriculture, Engineering, and Science.—Subjects, 1, 2, 3, 4, 5, 6, 7, and any three from 12, 13, 14, 15, 16, 17, 18. Instead of the literature part of 5, 10 or 11 will be accepted; but candidates presenting one of these will be required to take one year's advanced language work in his undergraduate course.

3. For the College of Literature.—Subjects 1, 2, 3, 4, 5, 6, 7, 8, and any three from 12, 13, 14, 15, 16, 17, 18. For those who desire to take courses including Greek, 9 is required and may be presented instead of the three sciences which would otherwise be selected from 12 to 18.

4. For entrance to the University without designation of a particular department.—Subjects 1, 2, 3, 4, 5, 6, 7, and any three from 8, 9, 10, 11, 12, 13, 14, 15, 16, 17. In this case special attention must be paid to the requirements for entrance to particular classes as given above and in connection with the description of the subjects taught, p. 87; also to the requirements for a degree, if this is desired, p. 163.

5. Persons over twenty-one years of age, not candidates for a degree, may be admitted to classes, after satisfying the Regent and professor in charge of the department in which such classes are taught, that they possess the requisite information and ability to pursue profitably, as special students, the chosen subjects. Such students are not matriculated; they pay the fees required of students in the preparatory classes.

SUBJECTS FOR ENTRANCE EXAMINATIONS.

1. ARITHMETIC.—Simple and denominate numbers, metric system of weights and measures, common and decimal fractions, practical measurements, percentage, ratio and proportion. Grammar or high school work.

2. GEOGRAPHY.—Mathematical, physical, and political divisions and natural features of the earth's surface; movements of the air and water, climates, natural and commercial productions, animals and man. Grammar school study.

3. HISTORY.—The most important facts in the history of the United States from the settlement of the country to the present time, but

especially the main features of the constitution and the development under it of the republic and of the states. Grammar or high school study.

4. English Grammar.—The essentials of orthography, etymology, and syntax, including the derivation and composition of words, their classification as parts of speech, declension and conjugation; sentential analysis, with definition and classification of parts, whether principal or subordinate, whether words, phrases, or clauses. Illustrative words, sentences, etc., may be required, as well as the correction of ungrammatical examples.

5. English Composition and Literature.—Correct spelling, capitalization, punctuation. paragraphing, definition and proper use of rhetorical figures; a knowledge of the qualities of style, the kinds of discourse, and the elements of versification; an acquaintance with the masterpieces of English literature. Besides answering questions on the above, the candidate will be required to write an essay of something like 500 words to illustrate his power of using the English language, and his knowledge of the literature. For 1894 the works required will be: Shakspere's Merchant of Venice, Scott's Lady of the Lake, Emerson's American Scholar, Longfellow's Evangeline, Macaulay's Second Essay on the Earl of Chatham. For 1895 the works required will be: Shakspere's Henry V., Scott's Ivanhoe, Macaulay's Essay on Clive, Hawthorne's House of the Seven Gables, Longfellow's Tales of a Wayside Inn.

Real equivalents for any of these works will be accepted.

6. Algebra.—Fundamental operations, factoring, fractions, simple equations, involution and evolution, radicals, quadratic equations and equations reducible to the quadratic form. The subject as given in Wells's Higher Algebra through quadratic equations, or the same in Wentworth's Algebra.

7. Geometry.—Plane, solid, and spherical geometry as given in Wells's Plane and Solid Geometry.

8. Latin.—Three books of Cæsar's Commentaries, five Orations of Cicero, six books of Vergil's Aeneid, with scansion of hexameter verse and the translation of English sentences into Latin prose, based on the portions of Cæsar and Cicero above named. This will necessitate a thorough knowledge of the etymology and syntax of Latin grammar.

Allen and Greenough's or Harkness's Grammar and Collar's Latin Prose Composition are recommended.

Real equivalents for any of the above mentioned works will be accepted.

The Roman method of pronunciation is used.

9. Greek.—Greek Grammar (Goodwin's), Greek Prose Composition (Collar and Daniel's), and three books of Xenophon's Anabasis, or an equivalent amount from any classic Greek author. Writing Greek with the accents will be required.

The so called Continental sounds of the vowels and diphthongs and pronunciation according to accent are recommended.

10. French.—Elements of grammar, tested by the correct translation of simple English sentences into French and by questions; reading easy French prose at sight. At least one year's work.

11. German.—Elements of grammar, tested by the correct translation of simple English sentences into German and by questions; reading easy German prose at sight. At least one year's work.

12. Physics.—The elements of physics as given in Gage's Introduction to Physical Science, taught with the use of apparatus for illustration and experiment. It is earnestly recommended that all teachers who can command the necessary apparatus prepare their pupils in a course of experiments such as is outlined in Hall & Bergen's Text Book of Physics.

13. Astronomy.—The subject as given in Newcomb and Holden's Astronomy for High Schools and Colleges.

14. Chemistry.—Elementary Inorganic Chemistry as presented in Remsen's Chemistry, Briefer Course; Shepard's "Elements of Chemistry;" Elliot & Storers "Manual of Elementary Chemistry," or Armstrong and Norton's "Laboratory Manual of Chemistry.

Laboratory practice is essential for the proper preparation in this subject and the laboratory note book must be submitted.

15. Physiology.—The anatomy, histology, and physiology of the human body and the essentials of hygiene, taught with the aid of charts and models and demonstrations upon inferior animals, to the extent given in Martin's Human Body, Briefer Course.

16. Botany.—The parts and organs of plants in the descriptive language of the science; the relations of plants to the atmosphere, to temperature, light, soil, etc., to the inferior animals, and to man; characteristics of prominent orders and the determination of species by use of an artificial key. Gray's Lessons and Manual.

17. Zoölogy.—The subject as taught in the best high schools with laboratory facilities. Mere text book work will not be accepted.

All persons who will enter the University at the opening of the term 1894, except those holding certificates of graduation from accredited schools, must present themselves at the Registrar's office, room 14, University Hall, at 9 o'clock a.m., Thursday, September 6th. At that time applications for admission will be received, also county superintendents' certificates covering part of the examinations, and applicants will be given all necessary directions as to examinations.

The program of examinations is as follows:

English Composition and Literature	Thursday	1:00 p.m.
Geography	"	3:30 "
Algebra	Friday	8:00 a.m.
U. S. History	"	10:30 "
Geometry	"	1:00 p.m.
Botany	"	3:30 "
Physics	Saturday	8:00 a.m.
Zoölogy	"	10:30 "
Physiology	"	1:00 p.m.
Astronomy, Physical Geography	"	3:30 "
Latin	Monday	8:00 a.m.
Greek, German, French	"	1:00 p.m.

County Superintendents' Certificates.—To prevent loss to those who are not prepared to enter the University, but might come, hoping to pass the examinations for admission, the following arrangement has been made.

County Superintendents of schools will be furnished with questions and instructions for the examination of candidates in the four common branches, arithmetic, geography, English grammar, and history of the United States; applicants who pass creditably, will, when they present the superintendents' certificates to that effect, be admitted to the classes of the preliminary year.

Persons who hold teachers' certificates from county superintendents will be admitted to the preliminary class without further examination.

ACCREDITED HIGH SCHOOLS.

The Faculty, after personal examination, appoints accredited high schools, whose graduates may be admitted to the University without further examination within twenty-eight months after the date of their

graduation. These must be schools of first-rate character, whose course of instruction includes all the studies required for admission to some one of the colleges of the University. A member of the Faculty will examine a school making application as to its facilities for teaching, its course and methods of instruction, and the general proficiency shown. If the report is favorable, the name of the school is entered in the published list of high schools accredited by the University. The graduates of these schools are admitted to any college to which their high school studies as certified by the principal have prepared them to enter. Annual reports are asked from these schools. A re-examination will be made whenever it may be deemed necessary.

The accredited schools whose graduates are admitted to any of the colleges of the University are the following public high schools:

SCHOOLS, AND SUPERINTENDENTS OR PRINCIPALS.

Alton, G. E. Wilkinson.
Atlanta, C. W. Harriman.
Aurora, East, W. Z. Pringle.
Aurora, West, Kittie Reynolds.
Beardstown, M. Moore.
Bement, J. M. Martin.
Blue Island, Robert McCay.
Champaign, C. A. Bowsher.
Canton, C. M. Bardwell.
Chicago, North, O. S. Wescott.
Chicago, Northwest, Franklin P. Fisk.
Danville, Joseph Carter.
Decatur, Louis B. Lee.
Dixon, W. H. Williamson.
Elgin, H. F. Derr.
Evanston, H. L. Boltwood.
Freeport, F. T. Oldt.
Galva, F. U. White.
Griggsville, W. R. Hatfield.
Hyde Park, Chas. W. French.
Jerseyville, J. Pike.
Kankakee, Ellis D. Walker.
Kewanee, Horace Phillips.
Lake, E. F. Stearns.
Arcola, G. W. Smith.
Auburn Park (Calumet High School) A. S. Hall.
Austin, B. F. Buck.
Belvidere, J. C. Zinser.
Bloomington, Fred B. Spaulding.
Cairo, T. C. Clendenen.
Carrollton, Clyde Slone.
Charleston, Louise Baumberger.
Chicago, South, Jeremiah Slocum.
Chicago, West, Geo. M. Clayberg.
Clinton, Ia., Julia J. Sweet.
Davenport, Ia., H. H. Roberts.
Delaven, Geo. A. Franklin.
Dundee, S. M. Abbott.
Englewood, James E. Armstrong.
Farmer City, R. W. Sharp.
Galena, Lawrence DeGraff.
Geneseo, Ada Schnabele.
Hinsdale, J. N. Kelley.
Jacksonville, Virginia Graves.
Joliet, J. Stanley Brown.
Keokuk, Ia., George F. Marshall.
La Grange, E. G. Cooley.
Lake View, Jas. H. Norton.

Lincoln, Jane Kidd.
Mattoon, E. Kate Carman.
Mendota, Wm. R. Foster.
Morrison, Mrs. P. F. Burtch.
Oak Park, W. H. Hatch.
Paris, A. Harvey.
Peoria, A. W. Beasley.
Pontiac, E. S. Combs.
Quincy, W. B. Corbyn.
Rock Island, J. A. Bishop,
South Chicago, C. I. Parker.
Springfield, Wm. W. Helmle.
Taylorville, A. C. Butler.
Virden, P. M. Silloway.
Yorkville, W. J. Sutherland.
Macomb, S. F. Hall.
Maywood, C. W. Minard.
Moline, B. C. Caldwell.
Nashville, Chas. L. Stout.
Ottawa, J. O. Leslie.
Pekin, F. W. Reubelt.
Pittsfield, I. F. Matthews.
Princeton, Richard Metcalf.
Rockford, W. A. Edwards.
Roodhouse, T. H. Cobbs.
Shelbyville, F. D. Jordan.
Streator, R. Williams.
Urbana, J. W. Hayes.
Wilmington, J. J. Eckman.

Also the high school of the Illinois State Normal University, at Normal, O. L. Manchester, Principal, and the high school of the Southern Illinois Normal University, at Carbondale.

The accredited schools whose graduates are admitted to the Colleges of Engineering, of Agriculture, or of Science, are the public high schools in

Aledo, J. P. Kuntz.
Barry, H. C. McCarrel.
Cambridge, Laura J. Haggart.
Centralia, Lulu Clark.
Collinsville, D. B. Fager.
DeKalb, J. T. Bowles.
East St. Louis, C. L. Manners.
Gibson City, J. D. Shoop.
Harvard, C. W. Groves.
Jonesboro, W. H. Lirely.
Lena, S. A. Harker.
Lyons, Ia., H. E. Robbins.
Milford, Eva Roberts.
Newman, J. L. Hughes.
Onarga, J. R. Freebern.
Paw Paw, M. L. Lyon.
Peru, F. S. Smedley.
Ridge Farm, E. Hollingsworth.
Rossville, H. W. Flanegin.
Augusta, Annie McKee.
Belleville, H. W. Brua.
Camp Point, J. W. Creekmur.
Chicago English High and Manual Training School, A. R. Robinson.
DuQuoin, J. E. Wooters.
Effingham, I. A. Smothers.
Greenville, D. W. Lindsey.
Hillsboro, Margaret Hubbard.
Keithsburg, K. M. Whitham.
Lexington, Ira M. Ong.
Marengo, C. W. Hart.
Mound City, M. N. McCartney.
Olney, O. J. Bainum.
Oregon, A. M. Steele.
Paxton, H. G. Strawn.
Polo, I. M. Bridgman.
Rochelle, C. F. Philbrook.
Savanna, B. F. Hendricks.

Sheldon, A. M. Brownson.
Sterling (Wallace High School), A. Bayliss.
Sycamore, A. J. Blanchard.
Virginia, T. W. B. Everhart.
Warsaw, A. W. Hussey.
Watseka, S. W. Dixon.
Wenona, Inez Wingate.
Sparta, John M. Nickles.
Sterling (2nd Ward), S. B. Hursh.
Sullivan, B. F. McClelland.
Tolono, Charles Jeffers.
Warren, W. C. Smith.
Washington. F. L. Calkins.
Winchester, A. V. Storm.

Also the Chicago Manual Training School, H. H. Belfield, Principal.

REGISTRATION.

At the beginning of each term each student must present himself for registration during the two days preceding the formation of classes; and he must be present and be registered at the first exercise of each class he is to attend.

CHOICE OF STUDIES.

Great freedom in the choice of studies is permitted. It is, however, necessarily required that the student shall be thoroughly prepared to enter, and keep pace with the classes in the chosen studies; that he shall take these in the terms and at the time of day elsewhere designated, and that, when expecting to take a degree, he pursue the studies leading to that degree. In the College of Engineering the courses are practically prescribed. Following the description of each course of instruction given in the general alphabetical list of courses, will be found the necessary requirements, if any, for admission to that particular course. Careful attention must be given to these requirements and to the sequence of studies thus indicated. For instance, under Astronomy 2, for students of the College of Engineering, page 98, there are required "Mathematics 4;" "Physics 1 and 3;" "Theoretical and Applied Mechanics 1." Turning now to the general list of subjects, p. 87, it is found that Mathematics 4 is Trigonometry, Physics 1 is the major course of one year, and Theoretical and Applied Mechanics 1 is Analytical Mechanics. All these subjects must have been satisfactorily passed before admission to the class in astronomy can be gained.

The work in military instruction and drill practice is required as described, of all male students during the freshman and sophomore years. Women may take an equivalent amount of gymnasium drill.

The described courses in rhetoric and oratory must be taken by all students at the times and to the extent given in the suggested and prescribed courses of study.

Each student must have three distinct studies, affording three daily class exercises, unless specially permitted by the Faculty to take less or more.

MILITARY SCIENCE.

The military instruction is under the charge of a graduate of the U. S. Military Academy, and an officer of the regular army of the United States. The course as a whole has special reference to the duties of officers of the line. A full supply of arms and ammunition is furnished by the War Department, including 300 cadet rifles and accoutrements, and two field pieces of artillery. Ammunition is supplied for the practice and target firing and for artillery use.

Every male student, able to perform military duty, and not excused for sufficient cause, is required to drill twice each week until he has gained six creditable term records. He is also required to study Drill Regulations for Infantry and to recite upon the same once a week until he passes two creditable term examinations. This practical instruction begins as soon as possible after he enters the University; but a preparatory student, carrying no freshman studies and not expecting to matriculate during the year, is not permitted to drill. The standings in study and drill are placed on record, with other class credits; two terms of recitations and drill count one credit, and the four remaining terms of drill another, and are requisite to graduation in every University course.

Appointments in the battalion are made on nomination by the professor in charge and confirmation by the Faculty.

Students who have passed two examinations in the drill regulations and who have gained two term credits in drill practice are eligible for corporals; those having three term credits in each are eligible for sergeants; and those having six term credits in each, for lieutenants and for officers of higher rank.

The battalion (six companies) is composed mainly of the members of the freshman and sophomore classes; the first supplying the corporals, the second, the sergeants, while the captains and lieutenants are taken from those of the junior class who have passed through the lower grades satisfactorily.

A special military scholarship, good for one year, is open to each student who attains the grade of a commissioned officer, the value of which is paid the holder at the close of the year.

An artillery detachment is organized mainly from the second year or sophomore class, which receives practical instruction twice each week during the college year.

Towards the close of the spring term, a committee appointed by the Faculty examines candidates for nomination to the governor of the state to receive commissions as brevet captains in the state militia. Candidates must be members of the senior class in full standing at the time of this examination; must have completed the course of military studies; must have served three terms as captains or lieutenants, and must be approved by the Faculty, as having good reputations as scholars, officers, and gentlemen.

Under the authority of the acts of corporation, the Trustees have prescribed a uniform of cadet gray, coat trimmed with black mohair braid, trousers with black cloth stripe, cut after the U. S. army pattern. The uniform of the cadet officers is of dark blue cloth for coat and light blue for trousers; cap for all of dark blue cloth, army pattern, with university badge embroidered thereon in gold bullion; white gloves; that of the band, dark blue throughout, with special trimmings.

The University Cornet Band is composed of students, and every full term of service therein is counted as one term of drill.

PHYSICAL TRAINING.

The spacious Military Hall affords admirable facilities for gymnasium practice for men, and there is a special gymnasium for women. In both there is a good supply of the best apparatus, and regular instruction is given by specialists in their lines. The Athletic Association has an easily accessible enclosed park with grand stand, track, and ball grounds. Practice and games are all under the general supervision of the instructor.

The gymnasium work for women (see course of instruction, p. 138) is treated as to time requirements and credits towards graduation like military science and practice for men. The gymnasium uniform for women consists of a navy blue flannel blouse and divided skirt with white trimmings, and black slippers. These uniforms must be procured within two weeks after the organization of the classes at the beginning of the year.

TERM EXAMINATIONS.

Examinations are held at the close of each term or oftener, or whenever any study has been completed. Any student failing to answer correctly 60 per cent of the questions proposed, loses all credit for that

study, and is precluded from proceeding with any other studies without special permission. If he answers from 60 to 74 per cent of the questions he is *conditioned* and may have another examination on application to, and arrangement with, the instructor. This arrangement must be made within ten days from notification of term standing; 75 per cent is required to pass.

A record is kept of each student's term standing.

A statement of the scholarship of each student will be sent to his parent or guardian as soon as may be after the end of each term.

DEGREES.

The usual bachelors' and masters' degrees are conferred upon those who satisfactorily complete the courses of study described under the different colleges. A candidate for a bachelor's degree must pass in the subjects marked *required* in his chosen course, and must conform to the directions given in connection with that course in regard to electives. In the College of Engineering he must complete the course of study as laid down. In the Colleges of Agriculture, of Science (41 credits in chemical group), and of Literature 40 term credits are required for graduation. This number includes two credits for military science for men, and for women the same number for physical culture. Men excused for cause from the military requirements, and women who do not take courses in physical culture, may elect in lieu thereof two extra terms' work in any subjects taught in the University.

Credits from other colleges or universities may be accepted by the Faculty for advanced standing; but at least one year's residence at the University and the completion of one year's work are necessary to secure a bachelor's degree.

In all cases an accepted thesis is required for graduation. The subject must be announced not later than the first Monday of November, and the completed thesis must be handed to the Dean of the proper College by April 30th. The work should be done under the direction of the professor in whose department the subject naturally belongs, and should be in the line of the course of study for which a degree is expected. The thesis should be based upon original research, and must contain at least 2,000 words, or an equivalent in tables, drawings, and illustrations. It must be presented upon regulation paper and will be deposited in the library of the University.

1. The degree of Bachelor of Arts will be given to those who complete a classical course in the College of Literature.

2. The degree of Bachelor of Letters will be given to those who complete one of the other courses in the College of Literature. The name of the course will be inserted after the degree.

3. The degree of Bachelor of Science will be given to those who complete a course of study in the College of Engineering, of Agriculture, or of Science. The name of the course will be inserted after the degree.

4. The master's degrees, M.A., M.L., and M.S., and the equivalent degrees of Civil Engineer and Mechanical Engineer, etc., are given to graduates of this University or of other similar institutions who have pursued at this University a year of prescribed graduate studies and have passed examinations thereon. Non-resident graduates of this University may receive masters' degrees within not less than three years after graduation by successfully passing examinations upon an accepted course of study and practice. (See Graduate School, p. 78.) Studies for a master's degree must be in the general line of the bachelor's degree already received, and of the degree sought.

In all cases an accepted thesis is required, and this should be presented at least one month before the close of the collegiate year. It must be based upon original research and must show scholarly acquirements of high order.

5. The degrees of Doctor of Philosophy and of Doctor of Science may be conferred upon graduates of this or other such university or college after three years of graduate study. (See Graduate School, p. 78.)

BOARD.

The University does not furnish board, but there is an abundance of suitable private places in Urbana and Champaign, within walking distance of the University, and easily accessible by electric railway, where students can obtain table board and rooms. Boarding clubs are formed at which the cost of meals is about two and a half dollars a week. Some students prepare their own meals, thus considerably reducing expenses.

The Business Agent and the Young Men's and Young Women's Christian Associations of the University will aid new students in procuring rooms and boarding places.

EXPENSES.

THE TUITION IS FREE in all the University classes, for matriculated students.

THE MATRICULATION FEE entitles the student to membership in the University until he completes his studies, and is $10 00

THE DIPLOMA FEE, payable before graduation, is 5 00

THE TERM FEE, for incidental expenses, is, for each student, except in Graduate School 7 50

THE TUITION FEE, for all special students (except in music), for students in the Junior Course in Agriculture, and for pupils of the Preparatory School, per term, is 5 00

THE MUSIC FEES ARE:—

Piano instruction, ten weeks—2 lessons a week 15 00
Ten weeks—1 lesson a week 8 00
Use of piano, one hour daily, per term 2 00
Vocal instruction, ten weeks—2 lessons a week 20 00
Ten weeks—1 lesson a week 12 00

No deduction on account of absence in either course, except in case of protracted illness.

Each student working in laboratories, or in the draughting or engineering classes, is required to make a deposit varying from 50 cents to $10, to pay for chemicals and apparatus used, and for any breakages or damages.

ALL BILLS due the University *must be paid within ten days after the student enters classes.*

ESTIMATES OF EXPENSES.

The following are estimated maximum and minimum annual expenses, exclusive of books, clothing, railroad fare, laboratory fees, if any, and small miscellaneous needs.

Term fees	$22 50	$22 50
Room rent for each student (two in a room)	22 50	50 00
Table board in boarding houses and clubs	90 00	126 00
Fuel and light	10 00	15 00
Washing at 60 cents per dozen	12 00	18 00
Total	$157 00	$231 50
Board and room in private houses, per week	4 00	6 00

Caution to Parents—Students' Funds.

The Business Agent will receive on deposit any funds parents may intrust to him to meet the expenses of their sons and daughters. *No greater error can be committed than to send young people from home with large amounts of spending money*, without the authoritative care of some prudent friend. Half the dissipation in colleges springs from excessive allowances of money. Students have little real need for money beyond that required for fees, board bills, and books. The attention of parents and guardians is earnestly requested to this matter, and especially in the case of those students who are under age.

PREPARATORY SCHOOL.

Edward G. Howe, Principal.

ADMISSION.

A candidate for admission must be at least sixteen years of age and must pass in subjects 1, 2, 3, and 4, under the heading "Subjects for Entrance Examinations," on page 154. Entrance should be made in September, when examinations for the purpose are held at the University, for 1894, on Thursday, Friday, and Saturday, the 6th, 7th, and 8th of that month, Examinations in these same subjects may be conducted in Illinois county superintendents of schools as for teachers' certificates, and their favorable reports will be accepted for entrance to this school. First or second grade teachers' certificates from superintendents in Illinois will also be taken for the same purpose.

Latin.—The Latin class of the Preparatory School begins with Cicero's Orations, and candidates for admission will be examined with a view to testing their ability to read that author in class. This examination will comprise the more fundamental facts of the language and will be based upon three books of Caesar or their equivalent. An ability to write simple Latin is taken as a satisfactory test of the preparation needed, and is preferred to all other offerings that candidates can make.

ADVANCED STANDING.

Pupils may present themselves for examination in any preparatory study they are ready for; and on passing, will be permited to select such

other work as they may be fitted to take up, either in the classes of the Preparatory School or in those of the University.

No pupil conditioned in any essential preparatory study, will be allowed to take advanced work, except by special permission.

COURSE OF STUDY.

The course of study extends through two years, and is specially intended to meet the needs of those desiring to prepare for a University course in the shortest time consistent with requisite thoroughness.

The following courses are taught:

Course Preparatory to the Colleges of Agriculture, of Engineering, and of Science.

FIRST YEAR.

1. Algebra; English; Physiology; Freehand Drawing.
2. Algebra; English; Zoölogy; History.
3. Algebra; English; Botany; History.

SECOND YEAR.

1. Geometry; English, Botany; French or German.
2. Geometry; English; Physics; French or German.
3. Geometry; English; physics; French or German.

Course Preparatory to the College of Literature, Except the Classical Course.

FIRST YEAR.

1. Latin; English; Physiology; Algebra.
2. Latin; English; Zoölogy; Algebra.
3. Latin; English; Botany; Algebra.

SECOND YEAR.

1. Latin; English; Botany; Geometry.
2. Latin; English; Physics; Geometry.
3. Latin; English; Physics; Geometry.

Course Preparatory to the Classical Course of the College of Literature.

FIRST YEAR.

1. Latin; English; Physiology; Algebra.
2. Latin; English; Zoölogy; Algebra.
3. Latin; English; Botany; Algebra.

SECOND YEAR.

1. Greek; Latin; Geometry.
2. Greek; Latin; Geometry.
3. Greek; Latin; Geometry.

ONE YEAR COURSE.

To pupils of mature age, robust health, and earnest character, a one year course is open. Maturity and life experience will compensate for some minor deficiencies in preparation.

Candidates must be on hand promptly at the opening of the year and take the regular examinations. Each case will then be considered on its merits, and, if thought best, permission will be granted for a trial term; this to be extended to a full year, if the pupil proves worthy and competent.

Application for this course must be made with the clear understanding that permission will be granted to such persons only and for such time only as shall be deemed best for the interests of all concerned.

One Year Course for College of Agriculture, of Engineering, and of Science.

1. Algebra; English; Physiology; Geometry.
2. Algebra; English; Physics; Geometry.
3. Algebra; English; Physics; Geometry.

If the knowledge of English is sufficient, French or German may be substituted.

One additional science must be made up at some other time.

GENERAL PLAN OF INSTRUCTION.

English.

This subject will be presented so as to increase the pupil's vocabulary, and train him to rapid and clear apprehension of the printed page and to elegance and exactness of expression. Grammar and Rhetoric will be taught in connection with the other work.

The reading and study of literary masterpieces will form part of the work, and, while furnishing material for the written exercises, will cultivate a taste for helpful books. Considerable collateral reading will be required. This will be so selected as also to aid the historical studies by presenting pictures of important epochs in the world's development.

History.

The aim in this will be to present a brief outline of the development of the human race. The topical method will be used, as most conducive to that thoughtful consideration of the facts presented by the past which leads to their application by the citizen of the present.

The work will be closely associated with that in English, and the required reading will be made mutually helpful to both subjects. *Myer's General History* and collateral reading.

Algebra.

Rapidity and accuracy in all operations will be rigidly required. Especial emphasis will be laid upon the use of purely literal expressions, radicals, fractional and negative exponents, and upon the fundamental nature of the equation. The text book used is *Wells's Higher Algebra.*

Geometry.

Plane and solid Geometry will be taken during the first and second terms. The third term will be devoted to inventive and original work, which will constitute a review of the whole subject. Especial attention will be paid to the development of the idea of a mathematical demonstration; and, as many students who can reason logically, can not express their ideas adequately, due attention will be paid to correctness of form.

As soon as the student has attained the art of rigorous demonstration, he will be required to devise constructions and demonstrations for himself. The text book used is *Wells's Plain and Solid Geometry.*

Latin.

Two years will be devoted to this subject by all who do not select a modern language. The work covered will be five orations of Cicero, six books of Vergil's Aeneid, with scansion of hexameter verse and the translation of English sentences into Latin prose, based on the portions of Cicero above named. This will necessitate a thorough knowledge of the etymology and syntax of Latin grammar. *Allen and Greenough's Grammar, and Collar's Latin Prose Composition.*

The Roman method of pronunciation is used.

Greek.

This will form a full study in the second year for all students in the classical course. Greek Grammar (*Goodwin's*), *Moss's First Greek Reader*, Greek Prose Composition (*Collar and Daniel's*), and three books of Xenophon's Anabasis.

German and French.

These will be begun, as their early possession will greatly aid the University work, especially in science and engineering.

The methods of teaching followed will be inductive; grammatical work being, from the first, based upon selected portions of standard works.

The languages themselves will, as far as practicable, be used in the class room. *Joynes-Meissner's German Grammar*, with *Joynes's German Reader; Bernhardt's Im Zwielicht 1. Van Daell's Beginning French*, accompanied by suitable texts.

Free Hand Drawing.

This will be taught in the first term, that the pupils may have the benefit of its valuable training in the studies which follow. *Frederick's Notes on Free Hand Drawing.*

Physiology.

This will be taken up first, because of its bearing on the health and habits of the pupils, and as being a suitable introduction to Zoölogy. Charts, skeleton, and manikin will be used, with illustrative material from the lower animals, to give a knowledge of the organs of the human body, their functions and relation to each other. *Huxley's Elementary Physiology.*

Zoölogy.

This study will follow Physiology, and, while comparative as regards man, will in the laboratory and class room extend the student's knowledge through the study of types to the scientific basis of classification and prepare for the more exact work of the University.

Botany.

This is a study of plants rather than of books about plants, though the latter are not disregarded. It is an introduction to the science, giving to those who go no farther in it a general acquaintance with the chief features of the vegetable kingdom, and to others, the required preparation for future work.

The analysis of simple flowers will form part of the work, and the preparation of a small herbarium of correctly named and properly mounted plants will be required.

The fall term of the second year will be devoted to the analysis of the more difficult flowers and to a study of the results of the season's growth, the preparation for the winter's rest, and renewed life in the spring.

Physics.

Two terms will be given to this subject, and much of the time to laboratory work.

In this study the spirit of scientific investigation will be cultivated along those lines of exact experiments and the formulation of physical laws from their comparison.

The note book, with an exact and orderly record of personal investigation, will be required as an index of work done. *Allen's Laboratory Physics.*

REGULATIONS.

Reports regarding all non-resident, minor pupils (and, upon request, regarding any others) will be sent to parents or guardians as soon as the pupils are settled at their work (by the end of the first month), and reports regarding all pupils will be sent out at the close of each term.

The calendar of the Preparatory School is the same as that of the University.

For fees and expenses see page 165.

For special information with regard to the Preparatory School, address Edward G. Howe, Champaign, Illinois.

LIST OF STUDENTS.

GRADUATE SCHOOL.

Bartlett, Henry Emmett, B. S., Univ. of Ill.,	*Mt. Sterling*,	Civil Engineering.
Carter, Charles Willard, B.L., Univ. of Ill. (Fellowship),	*Aledo*,	Eng. and Mod. Lang.
Gibbs, William David, B.S., Univ. of Ill. (Fellowship),	*Winchester*,	Agriculture.
Hart, Ralph Warner, B.S., Univ. of Ill.,	*Harvey*,	Architecture.
Miller, Clendon Vanmeter, B.S., Univ. of Ill. (Fellowship),	*Mattoon*,	Chemistry.
Piatt, Herman S, A.B., Univ. of Ill.,	*Champaign*,	Classical.
Surface, Harvey Adam, M.S., Ohio State Univ.,	*Waynesville, O.*,	Natural Science.
Vial, Robert Clark, B.S., Univ. of Ill.,	*Western Springs*,	Civil Engineering.
Connet, Ella, B.L., Univ. of Ill.,	*Champaign*,	Eng. and Mod. Lang.
Palmer, Mrs. Anna Shattuck, B.L., Univ. of Ill.,	*Champaign*,	Eng. and Mod. Lang.

RESIDENT GRADUATES.

Beach, Charles Worth, B.S., State Agricultural College, Colo.,	*Stuart, Ia.*,	Civil Engineering.
Bennett, Cleaves, M.L., Univ. of Ill.,	*Champaign*,	Natural Science.
Benson, Edward Mills, B.S., Univ. of Ill.,	*Colfax*,	Electrical Engineering.
Brown, Frank Manear, B.S., Univ. of Ill.,	*Champaign*,	Architecture.
Cantine, Edward Ike, B.S., Univ. of Ill.,	*Lopez, Wash.*,	Electrical Engineering.

Kendall, William Finley, B.S., Univ. of Ill.,	*Rock Island*,	Architecture.
Pillsbury, Arthur Low, B.S., Harvard Univ.,	*Urbana*,	Architecture.
Townsend, William, B.S., Univ. of Ill.,	*Champaign*,	Civil Engineering.
Wright, Royal, B.L., Univ. of Ill,	*Urbana*,	Eng. and Mod. Lang.
Pettee, Mrs. Ida May, B.L., Univ. of Ill.,	*Champaign*,	Eng. and Mod. Lang.
Seibert, Emma Effie, B.S., Univ. of Ill.,	*Riverdale*,	Art and Design.
Sim, Keturah Elizabeth, B.L., Univ. of Ill.,	*Urbana*,	Eng. and Mod. Lang,

SENIOR CLASS.*

Atwood, Levi Patten,	*Rockford*,	Civil Engineering.
Babcock, Clyde Leslie,	*Harvard, Neb.*,	Civil Engineering.
Barker, Louis William,	*Sparta*,	Electrical Engineering.
Bauman, Otto	*Quincy*,	Electrical Engineering.
Beasley, Harrison Easton,	*Peoria*,	Civil Engineering.
Braucher, Herbert Hill,	*Lincoln*,	Agriculture.
Browning, Howard Allen,	*Elgin*,	Architecture.
Burrill, William Thomas	*Shelby, Neb.*,	Architecture.
Bush, Arthur Willis,	*Joliet*,	Architecture.
Butterfield, Clarence James,	*Chicago*,	Architecture.
Carmack, Clyde Roberts,	*Camargo*,	Mechanical Engineering.
Chipman, Paul,	*Mt. Carmel*,	Civil Engineering.
Clark, Amos Cable,	*Urbana*,	Architecture.
Coffman, Birch David,	*Champaign*,	Natural Science.
Cornell, Frank Howe,	*Yorkville*,	Natural Science.
Crawford, Thomas,	*Sterling*,	Electrical Engineering.
Dickinson, Richard Jay,	*Eureka*,	Civil Engineering.
Duffy, Sherman,	*Ottawa*,	Latin.
Eakle, Silas Jackson,	*Forreston*,	Chemistry.
Elder, Charles Abbott,	*Topeka, Kansas*,	Architecture.
Engberg, Martin Jonas,	*Chicago*,	Chemistry.
Fellheimer, Alfred,	*Chicago*,	Architectural Engineering.

*The students of the four undergraduate classes are classified upon the credits earned by the beginning of the spring term, 1894.

Ferris, Hiram Burns,	*Carthage*,	Classical.
Fletcher, Marcus Samuel,	*Ridge Farm*,	Natural Science.
Foote, Ferdinand John,	*Champaign*,	Electrical Engineering.
Foster, Alfred Bradford	*Bradford*,	Civil Engineering.
Frederickson, George,	*Champaign*,	Natural Science.
Frye, Theodore Christian,	*Congerville*,	Natural Science.
Funston, Jesse Grant,	*Champaign*,	Mechanical Engineer'g.
Gaut, Robert Eugene,	*Mt. Sterling*,	Civil Engineering.
Goldschmidt, Otto Emil,	*Chicago*,	Electrical Engineering.
Hallinen, Joseph Edward,	*Champaign*,	Natural Science.
Heideman, George Herman,	*Elmhurst*,	Electrical Engineering.
Hicks, Preston Thomas,	*Warren*,	Civil Engineering.
Holbrook, Frederick Samuel,	*Englewood*,	Chemistry.
Holston, Benjamin Baldwin,	*Nashville*,	Natural Science.
Hottes, Charles Frederick,	*Mascoutah*,	Natural Science.
Jansen, Dietrich Herman,	*Pekin*,	Civil Engineering.
Jasper, Thomas,	*Quincy*,	Electrical Engineering.
Johannsen, Albert,	*State Center, Ia.*,	Architecture.
Johannsen, Oskar August,	*State Center, Ia.*,	Architecture.
Keeler, Frederick Blair,	*Earlville*,	Architecture.
Kennedy, John William,	*Collinsville*,	Architecture.
Kerchner, Fred William	*Belleville*,	Chemistry.
Kimball, Conrad Bryant,	*Champaign*,	Architecture.
Lake, Edward John,	*Viroqua, Wis.*,	Architecture.
Lowry, John Albert,	*Gibson City*,	Civil Engineering.
McCaskrin, George Washington,	*Rantoul*,	Natural Science.
McCaskrin, Harry Madison,	*Rantoul*,	Natural Science.
McConnell, Ernest,	*Table Rock, Colo.*,	Architecture.
McNutt, John, Jr.,	*Humboldt*,	Latin.
Mather, Fred Elbert,	*Naperville*,	Architecture.
Maxon, Robbins Yale,	*Danville*,	Civil Engineering.
Miller, Grant Clark,	*Rockford*,	Architecture.
Mogensen, Peter,	*Copenhagen, Den.*,	Civil Engineering.
Morris, Edgar William,	*Onarga*,	English and Mod. Lang.
Morrissey, Daniel C,	*Champaign*,	English and Mod. Lang.
Nelson, Elnathan Kemper,	*Paris*,	Chemistry.
Parry, Joseph Lawrence,	*Tolono*,	English and Mod. Lang.
Phelps, Albert Charles,	*Lockport*,	Architecture.
Reed, James Horatio,	*Evanston*,	Electrical Engineering.
Riley, Walter Busey,	*Champaign*,	English and Mod. Lang.
Rutledge, John Joseph,	*Alton*,	Mining Engineering.

Schneider, Albert,	*Weston*,	Natural Science.
Slater, William Frederick,	*Momence*,	Electrical Engineering.
Somers, Elbert Sheldon,	*San Diego, Cal.*,	Architecture.
Spurgin, William Grant,	*Urbana*,	Classical.
Stocker, Edwin Warren,	*Rock Island*,	Architecture.
Strauss, William,	*Pittsfield*,	Chemistry.
Strehlow, Oscar Emil,	*Champaign*,	Civil Engineering.
Sy, Albert Philip,	*Altamont*,	Chemistry.
Tackett, William C,	*Champaign*,	English and Mod. Lang.
Templeton, Benjamin Franklin,	*Palestine*,	Classical.
Tower, Willis Eugene,	*Chana*,	Chemistry.
Trego, Charles Henry,	*Hoopeston*,	Electrical Engineering.
Walton, Thomas Percival,	*Paxton*,	Civil Engineering.
Weaver, Leslie Alvord,	*Danville*,	Latin.
Webster, Charles Carlton,	*Polo*,	Electrical Engineering.
Weedman, Fred John,	*Chicago*,	Eng. and Mod. Languages.
White, Solon Marks,	*Sandwich*,	Natural Science.
Wilder, Charles Thornton,	*Champaign*,	Natural Science.
Wood, Robert Alvin,	*Woodburn*,	Mechanical Engineering.
Yeakel, William Kriebel,	*Polo*,	Natural Science.
Boggs, Pearl,	*Urbana*,	Classical.
McCaskrin, Louise Elizabeth,	*Rantoul*,	Natural Science.
McCormick, Flora,	*Champaign*,	English and Mod. Lang.
Nichols, Maude E,	*Urbana*	Natural Science.
Scott, Daisy Coffin,	*Champaign*,	Latin.
Shawhan, Gertrude,	*Urbana*,	English and Modern Lang.
Thompson, Marion,	*Bement*,	Latin.
Wingard, Anna Laura,	*Champaign*,	English and Mod. Lang.
Woolsey, Ola C,	*Polo*,	Latin.

JUNIOR CLASS.

Arms, Franklin David,	*Chicago*,	Architecture.
Arms, Herbert Clarke,	*Chicago*,	Architecture.
Armstrong, John Adam,	*Kewanee*,	Mechanical Engineering.
Atkinson, John Thomas,	*Wilmington*,	Mechanical Eng.
Ayers, Clarence Otto,	*Nashville*,	Natural Science.
Barr, Richard James,	*Wilton Center*,	Eng. and Mod. Lang.
Barry, Charles,	*Henry*,	Mechanical Engineering.
Bassett, John Benjamin,	*Kewanee*,	Civil Engineering.
Baum, Henry William.	*Phoenix, Ariz.*,	Civil Engineering.

Beebe, Fred Albert,	*Wisner, Neb.*,	Mechanical Eng.
Boon, William Guthrie,	*Armstrong*,	Civil Engineering.
Bower, Robert Allan,	*Tolono*,	Eng. and Mod. Lang.
Brenke, William Charles,	*Chicago*,	Chemistry.
Burdick, Charles Baker,	*Sterling*,	Civil Engineering.
Burt, Henry Jackson,	*Urbana*,	Civil Engineering.
Busey, Frank Lyman,	*Urbana*,	Mechanical Engineering.
Campbell, George Henry,	*Louisville*,	Eng. and Mod. Lang.
Capps, Earl Vanhise,	*Mt. Pulaski*,	Electrical Eng.
Carberry, Ray Shepard,	*Mansfield*,	Civil Engineering.
Carpenter, Frank Albert,	*Rockford*,	Architecture.
Chester, Henry Ezra,	*Champaign*,	Chemistry.
Chester, Wilfred Dudley,	*Champaign*,	Mining Engineering.
Clement, Clarence Adelbert,	*Tiskilwa*,	Municipal Engineering.
Clinton, John Dewitt,	*Polo*,	Chemistry.
Dewey, George French,	*Cairo*,	Civil Engineering.
Dillon, William Henry,	*Normal*,	Architectural Engineering.
Drake, Louis Sanford,	*Chicago*,	Eng. and Mod. Lang.
Fouts, Lewis Hayden,	*Bradford*,	Eng. and Mod. Lang.
Fulton, George Thomas,	*Waterman*,	Civil Engineering.
Green, James Albert,	*Ivesdale*,	Mechanical Engineering.
Hall, Emery Stanford	*Urbana*,	Architecture.
Hamilton, Frank Henry,	*Springfield*,	Civil Engineering.
Harms, Armin,	*Rock Island*,	Chemistry.
Harvey, Guy Charles.	*Tolono*,	Chemistry.
Heaton, Thomas Reid,	*Delavan*,	Civil Engineering.
Herdman, Herbert Orvill,	*Taylorville*,	Natural Science.
Hiles, Elmer Kirkpatrick.	*Chicago*,	Mechanical Engineering.
Hoag, Parker Hale,	*Champaign*,	Classical.
Hobbs, Reuben Merrill,	*Yorkville*,	Chemistry.
Hoblit, John Alexander, Jr.,	*Atlanta*,	Mechanical Engineering.
Holtzman, Stephen Ford,	*Pontiac*,	Architectural Engineering.
Honens, Fred William,	*Milan*,	Civil Engineering.
Hunt, Ernest Alexander,	*Urbana*,	Electrical Engineering.
Jerry, Edward Ellsworth,	*Urbana*,	Civil Engineering.
Junkersfeld, Peter,	*Sadorus*,	Electrical Engineering.
Kent, Louis Maxwell,	*Danville*,	Eng. and Mod. Lang.
Ketchum, Milo Smith,	*Elmwood*,	Civil Engineering.
Ketchum, Richard Bird,	*La Prairie*,	Civil Engineering.
Lemen, William Clarence Smith,	*Uniontown, Ky.*,	Civil Engineering.
Lewellyn, David Rossiter,	*Sterling*,	Electrical Engineering.

Long, Albert Milton,	*Virden*,	Architecture.
Lyons, Timothy John,	*Sadorus*,	Eng. and Mod. Lang.
McElfresh, Fred Morgan,	*Jacksonville*,	Natural Science.
McLane, John Wallace,	*Allerton, Ia.*,	Chemistry.
McRae, John Alexander,	*Kewanee*,	Mechanical Engineering.
Mann, Edward Loring,	*Gilman*,	Eng. and Mod. Lang.
Marsh, Horatio Richmond,	*Joliet*,	Natural Science.
Maxwell, Charles Jacob,	*Champaign*,	Chemistry.
Morrison, William Robert,	*Joliet*,	Architecture.
Munn, Alexander Majors,	*Swift, Neb.*,	Civil Engineering.
Noble, Charles William,	*Chicago*,	Architecture.
Noble, William,	*Champaign*,	Classical.
Powell, John Ellsworth,	*Powellton*,	Civil Engineering.
Quade, John Conrad,	*Moline*,	Civil Engineering.
Reardon, Edward Emmett,	*Boynton*,	Eng. and Mod. Lang.
Reely, Thomas,	*Spring Green, Wis.*,	Architecture.
Reeves, Harley Edson.	*Urbana*,	Civil Engineering.
Root, George Hinchliff,	*Chicago*,	Architectural Engineering.
Rowe, Herbert Brunskill,	*Redmon*,	Chemistry.
Roysdon, William Ira,	*Champaign*,	Eng. and Mod. Lang.
Sayers, Albert Jefferson,	*Champaign*,	Mechanical Engineering.
Scott, William John,	*Champaign*,	Eng. and Mod. Lang.
Scurlock, Henry Harrison,	*Jackson, O.*,	Eng. and Mod. Lang.
Seastone, Charles Victor,	*New Boston*,	Civil Engineering.
Shepardson, John Eaton,	*Aurora*,	Civil Engineering.
Simons, Alexander Martin,	*Quincy*,	Electrical Engineering.
Sperling, Godfrey,	*Dewey*,	Civil Engineering.
Stark, Robert Watt,	*Augusta*,	Chemistry.
Stoltey, Benjamin Franklin,	*Champaign*,	Archi'tural Engineeri'g.
Stone, Frank Lemuel,	*Port Byron*,	Municipal Engineering.
Thomas, Homer,	*Kickapoo*,	Archi'tural Engineering.
Vance, Walter Noble,	*Bement*,	Electrical Engineering.
Weinshenk, Theodore,	*Champaign*,	Mechanical Engineering.
Williams, Parker Merrill,	*Moline*,	Electrical Engineering.
Brown, Katharine,	*Oreana*,	Natural Science.
Call, Hortense,	*Urbana*,	Natural Science.
Clarke, Florence,	*Quincy*,	Natural Science.
Cole, Mary Maude,	*Rantoul*,	Latin.
Folger, Rachel Ellen,	*Ridge Farm*,	Natural Science.
Foote, Mrs. Dora Francelia Burton,	*Champaign*,	Natural Science.
Forbes, Bertha Van Hoesen,	*Urbana*,	Natural Science.

Green, Marianna,	*Champaign*,	Eng. and Mod. Lang.
Ludden, Eva Louise,	*East Lynn*,	Eng. and Mod. Lang.
Mills, Mary Wilder,	*Webster Groves, Mo.*,	Natur'l Science.
Moore, Grace Lillian,	*Tolono*,	Natural Science.
Pillsbury, Bertha Marion,	*Urbana*,	Classical.
Sparks, Marion Emeline,	*Champaign*,	Classical.
Spencer, Bertha,	*Decatur*,	English and Mod. Lang.
Stewart, Mabel,	*Champaign*,	Natural Science.

SOPHOMORE CLASS.

Adams, Edward Langford,	*Austin*,	Mechanical Engineering.
Arnold, John William,	*Lockport*,	Civil Engineering.
Atherton, George Henry,	*Streator*,	Eng. and Mod. Lang.
Bailey, Leonard Lionel,	*Chicago*,	Architectural Engineering.
Ball, Elmer Newton,	*Mitchellville, Ia.*,	Architecture.
Banschbach, Edward Aaron,	*Princeton*,	Electrical Engineering.
Beasley, Abel Harwood,	*Champaign*,	Chemistry.
Begole, Joshua Franklin,	*O'Fallon*,	Mechanical Engineering.
Boyd, George,	*Roseville*,	Civil Engineering.
Brower, Ralph Plumb,	*Champaign*,	Civil Engineering.
Burke, William Harry,	*Champaign*,	Electrical Engineering.
Burtt, Wilson Bryant,	*Hinsdale*,	Civil Engineering.
Campbell, Walter Gilbert,	*Champaign*,	Electrical Engineering.
Carswell, Arthur Scott,	*New City*,	Electrical Engineering.
Chatten, Melville Clarke,	*Quincy*,	Architecture.
Colver, Horace Nathaniel,	*Marengo*,	Electrical Engineering.
Cooper, Paul Henry,	*Mendota*,	Electrical Engineering.
Cowles, Roy Merrick,	*Englewood*,	Mechanical Engineering.
Cutter, Scott Clay,	*Oswego*,	Chemistry.
Donnan, Alexander,	*Independence, Ia.*,	Architecture.
Dubsky, John Joseph, Jr.,	*Chicago*,	Civil Engineering.
Durstine, Warren Edward,	*Rock Falls*,	Electrical Engineering.
Estee, Henry Clarence,	*Gibson City*,	Civil Engineering.
Evans, Robert Herman,	*Bloomington*,	Architecture.
Everett, Frank Milton,	*Quincy*,	Electrical Engineering.
Everhart, Rollin Orlando,	*Pana*,	Classical.
Fay, Frank Earle,	*Marengo*,	Civil Engineering.
Fitzwilliam, Frank Joel,	*Bloomington*,	Arcitecture.
Gabelman, Julius,	*Okawville*,	Civil Engineering.

Gamble, Samuel Wesley,	*Chicago*,	Architecture.
Ganung, Howard D.	*North Fairfield O.*,	Architectural Eng.
Gazzolo, Frank Henry Serafino,	*Chicago*,	Chemistry.
Green, Frank Hopkins,	*Ivesdale*,	Mechanical Engineering.
Green, Herbert John,	*Kewanee*,	Architecture.
Haskell, Howard Hall,	*Mendota*,	Electrical Engineering.
Havard, Oliver David,	*Urbana*,	Electrical Engineering.
Higgins, Charles Campbell,	*Aurora*,	Electrical Engineering.
Hindman, John,	*Champaign*.	Eng. and Mod. Lang.
Hopkins, Frank Coffeen,	*Chicago*,	Electrical Engineering.
Hottes, Henry Gustav,	*Mascoutah*,	Architecture.
Howard, George Augustus,	*Highland Park*,	Architectural Eng.
Hubbard, George David,	*Urbana*,	Natural Science.
Hughes, Frank Alexis,	*Pueblo, Colo.*,	Civil Engineering.
Huston, Fred Thales,	*Blandinsville*,	Natural Science.
Jobst, George J,	*Peoria*,	Civil Engineering.
Jones, Fred R,	*Neponset*,	Mechanical Engineering.
Jones, Walter Wynn,	*Chicago*,	Civil Engineering.
Keeler, Harry,	*Chicago*,	Natural Science.
King, Wesley, Edward,	*Champaign*,	Eng. and Mod. Lang.
Kirkpatrick, Harold H,	*Mayview*,	Classical.
Klossowski, Theodore Julius,	*Dixon*,	Civil Engineering.
Leffler, Burton Rutherford,	*Naperville*,	Civil Engineering.
Lewis, Charles Milton,	*Blue Mound*,	Architecture.
Liese, George Charles,	*Nashville*,	Architecture.
Lilly, John Crozier,	*Champaign*,	Natural Science.
Linn, Homer Roberts,	*Byron*,	Mechanical Engineering.
Ludwick, George Washington,	*Champaign*,	Architecture.
MacGregor, Leonard Allen,	*Earlville*,	Architecture.
McKee, James Harry,	*Chicago*,	Mechanical Engineering.
McNichols, Ira Arthur,	*Toledo*,	Chemistry.
Manard, Robert Payton,	*Rockford*,	Architecture.
Marble, Harry Curtiss,	*Champaign*,	Electrical Engineering.
Mason, William Charles,	*Ripon, Wis.*,	Architecture.
Maxwell, Irvine William,	*Savoy*,	Electrical Engineering.
Mead, Ellis Herman,	*Belvidere*,	Electrical Engineering.
Mell, Joseph Leonard.	*San Jose*,	Civil Engineering.
Milne, Edward Lawrence,	*Lockport*,	Civil Engineering.
Morgan, Walter Montgomery,	*Kinmundy*,	Eng. and Mod. Lang.
Morse, Jeddidiah D.,	*Champaign*,	Electrical Engineering.
Morse, Samuel Theodore,	*Carlinville*,	Civil Engineering.

Mueller, Oscar,	*Decatur*,	Mechanical Engineering.
Myers, James William,	*Chrisman*,	Eng. and Mod. Lang.
Newcomer, Joseph Hardin,	*Petersburg*,	Mechanical Engineering.
Noble, Harry Charles,	*Champaign*,	Eng. and Mod. Lang.
Oyler, Harry Schuyler,	*Mt. Pulaski*,	Chemistry.
Perkins, Allie Christian,	*Tolono*,	Electrical Engineering.
Pfeffer, John Edward,	*Bondville*,	Mechanical Engineering.
Phelps, George Budd,	*Carlinville*,	Architecture.
Pierce, William Thomas,	*Mt. Carroll*,	Civil Engineering.
Pinkerton, Cyrus Bertram Eugene,	*Rantoul*,	Classical.
Porter, Robert Knight,	*Champaign*,	Classical.
Reasoner, Mathew Aaron,	*Fisher*,	Natural Science.
Rickard, Earnest Thomas,	*Springfield*,	Pharmacy.
Risor, Cady Alvern,	*Eureka*,	Electrical Engineering.
Roby, Luther Edward,	*Decatur*,	Mechanical Engineering.
Row, George Edward,	*Centralia*,	Mechanical Engineering.
Saunders, Harry J,	*Chicago*,	Natural Science.
Scott, George Harvey,	*Rantoul*,	English and Mod. Lang.
Shea, John Clark,	*Danville*,	Mechanical Engineering.
Shippee, Henry Claud,	*Ashton*,	Pharmacy.
Smith, Friend Orville,	*Ashton*,	Pharmacy.
Steele, William LaBarthe,	*Springfield*,	Architecture.
Stone, Percy Allyn,	*Bradfordton*,	Elect. Engineering.
Sweney, Don,	*Gettysburg, Pa.*,	Mech. Engineering.
Tarble, Myron Joy,	*Aurora*,	Municipal Engineering.
Thompson, Fred Lawrence,	*Isabel*,	Civil Engineering.
Tilton, Harry William,	*Mt. Carmel*,	Electrical Engineering.
Vail, Walter Cheney,	*Kewanee*,	Architecture.
VanOrstrand, Charles Edwin,	*Pekin*,	Civil Engineering.
Vickery, Charles Roy,	*Dwight*,	Natural Science.
Wakefield, George Mighell,	*Waterman*,	Electrical Engineering.
West, George Amasa,	*Leaf River*,	Mechan. Engineering.
Whitham, Myron Elwin,	*Warren*,	Mechanical Engineering.
Whittemore, Floyd,	*Sycamore*,	Mechanical Engineering.
Williams, Scott,	*Bloomington*,	Architecture.
Wills, George Arthur,	*Chicago*,	Electrical Engineering.
Wills, Oscar T,	*Mendota*,	Electrical Engineering.
Woody, Frederick Way,	*Champaign*,	Municipal Engineering.
Zimmerman, Walter,	*Champaign*,	Mechanical Engineering.
Bennett, Georgia E,	*Milford Centre, O.*,	Chemistry.
Besore, Nellie,	*Urbana*,	Latin.

Cairns, Cora Mae,	*Polo*, English and Mod. Languages.
Kiler, Aureka Belle,	*Urbana*, Eng. and Mod. Languages.
Leal, Sophie Nott,	*Urbana*, Latin.
Mather, Althea Susan,	*Joliet*, Eng. and Mod. Languages.
Moore, Minnie Rose,	*French Grove*, Eng. and Mod. Lang.
Munhall, Grace May,	*Champaign*, Eng. and Mod. Lang.
Noble, Isabelle,	*Urbana*, English and Mod. Lang.
Noble, Mary Elizabeth,	*Urbana*, Latin.
Northam, Lottie Alice,	*Nora*, Natural Science.
Read, Kate,	*Grand Ridge*, Eng. and Mod. Lang.
Stewart, Grace Adele,	*Champaign*, Eng. and Mod Lang.
Webster, Sarah Emeline,	*Champaign*, Natural Science.

FRESHMAN CLASS.

Allen, James Charles,	*Rockford*, Architectural Engineering.
Anderson, George Forbes,	*Carbondale*, Civil Engineering.
Armstrong, James Wadsworth,	*Cedar Rapids, Ia.*, Architecture.
Armstrong, John Walter,	*Champaign*, Natural Science.
Barker, Robert Collyer,	*Peoria*, Chemistry.
Barker, William Prentice, Jr.,	*Batavia*, Civil Engineering.
Barnhart, John Carns,	*Rock Island*, Architecture.
Barr, George Andrew,	*Wilton Center*, Latin.
Beadle, Thomas B,	*Kewanee*, Chemistry.
Beebe, Charles David,	*Evanston*, Mechanical Engineering.
Beem, Fred Clarkson,	*Ottawa*, Architecture.
Bell, Edgar Deforest,	*Urbana*, English and Modern Lang.
Blakeslee, James Woodberry,	*Kinmundy*, Eng. and Mod. Lang.
Block, Richard Arthur,	*Sidney*, Electrical Engineering.
Boone, Allen,	*Chrisman*, Electrical Engineering.
Bowen, John,	*Kewanee*, Civil Engineering.
Bower, Samuel Meharry,	*Tolono*, Natural Science.
Branch, James,	*Seymour*, Natural Science.
Brandt, Eugene Hermann,	*Appleton City, Mo.*, Architecture.
Brode, Luther David,	*Urbana*, Electrical Engineering.
Brower, Lyle Ireneus,	*Ottawa*, Architecture.
Brown, Walter Burrows,	*Rock Falls*, Chemistry.
Brubaker, William Arthur,	*Robinson*, Architectural Engineering.
Burroughs, Edward,	*El Paso*, Classical.
Cahow, Edwin Scott,	*Kewanee*, Mechanical Engineering.

Campbell, George Washington,	*Belvidere*,	Architecture,
Capron, Frank Read,	*Carthage*,	Architecture.
Carpenter, Hubert Vinton,	*Argo*,	Electrical Engineering.
Carpenter, Oliver Elijah,	*Chicago*,	Electrical Engineering.
Chester, Guy Jacob,	*Champaign*,	Electrical Engineering.
Chester, Manley Earle,	*Champaign*,	Electrical Engineering.
Clarke, Octave Besançon,	*Quincy*,	Electrical Engineering.
Coffeen, Harry Clay,	*Champaign*,	Chemistry.
Crellin, Charles Virgil,	*Winfield, Ia.*,	Electrical Engineeri'g.
Davis, John Franklin,	*Watseka*,	Pharmacy.
DeVries, Stephen George,	*Pekin*,	Electrical Engineering.
Dewey, James Ansel,	*Urbana*,	Natural Science.
Doney, Oliver Kinsey,	*Urbana*,	Eng. and Mod. Lang.
Dull, William Raymond,	*Burlington, Kas.*,	Mechanical Eng.
Dunaway, Arthur Newton,	*Ottawa*,	Electrical Engineering.
Dunlap, Elmer Edgar,	*Columbus, Ind.*,	Architecture.
Eaton, Henry Cassius,	*Fulton*,	Architecture.
Edbrooke, Harry Willoughby James,	*Chicago*,	Architecture.
Eichberg, William Nathan,	*Chicago*,	Electrical Engineering.
Errett, Harry Boyd,	*Kewanee*,	Architecture.
Ewing, Joseph Chalmer,	*Gibson City*,	Electrical Engineering.
Flannigan, Edwin Clark,	*Champaign*,	Natural Science.
Flynn, Thomas Francis,	*Tolono*,	Electrical Engineering.
Forbes, Ernest Browning,	*Champaign*,	Natural Science.
Frees, Herman Edward,	*Chicago*,	Chemistry.
Fuller, Spencer Samuel,	*Hoopeston*,	Natural Science.
Furst, Frank Everett,	*Freeport*,	Eng. and Mod. Lang.
Gayman, Bert A,	*Champaign*,	Electrical Engineering.
Gearhart, Orval Lee,	*Farmer City*,	Architecture.
Gilchrist, Francis Foster,	*Chicago*,	Civil Engineering.
Graham, Arthur,	*Alexis*,	Electrical Engineering.
Graham, Hugh,	*Illiopolis*,	Civil Engineering.
Grimes, George Lyman,	*Moline*,	Mechanical Engineering.
Gulick, Clyde Denny,	*Champaign*,	Natural Science.
Hadsall, Harry Hugh,	*Wilmington*,	Civil Engineering.
Haley, Arthur Fenn,	*Champaign*,	Eng. and Mod. Lang.
Hamilton, LeRoy F,	*Kewanee*,	Latin.
Hammers, Morgan J,	*Champaign*,	Mechanical Engineering.
Hanson, Samuel Jay,	*Urbana*,	Eng. and Mod. Lang.
Harvey, Harry Hayler,	*Paris*,	Eng. and Mod. Lang.
Herwig, George Washington,	*Mason City*,	Agriculture.

Hiller, George Myers,	*Kohoka, Mo.,*	Classical.
Hills, Stacey Romeyn,	*Urbana,*	Architecture.
Hobart, Albert Claude,	*Elgin,*	Civil Engineering.
Horn, Carl John,	*Naperville,*	Architecture.
Hostetter, Alvin,	*Camp Point.*	Architecture.
Hotchkiss, Robert James,	*Peoria,*	Architecture.
Howard, Hartwell Carver, Jr.,	*Champaign,*	Natural Science.
Howison, Charles,	*Sandwich,*	Architecture.
Hull, John Kress,	*Moline,*	Eng. and Mod. Languages.
Johnson, Martin Nathaniel,	*Moline,*	Mechanical Engineering.
Judy, Herbert Bolivar,	*Troy, O.,*	Architecture.
Kiler, William Henry,	*Urbana,*	Eng. and Mod. Languages.
Kingman, Charles Dudley,	*Mattoon,*	Civil Engineering.
Kinzel, Frederick August,	*Mattoon,*	Classical.
Kistner, Theodore Charles,	*Carlinville,*	Architecture.
Kuehne, Carl Oskar,	*Chicago,*	Architectural Engineering.
Lantz, Simon Everett,	*Carlock,*	Natural Science.
Larson, Charles Sigurd,	*Chicago,*	Electrical Engineering.
Leigh, Charles Wilbur,	*La Prairie Centre,*	Mechan. Eng'ng.
McDill, James Theodore,	*Sparta,*	Electrical Engineering.
Mann, Arthur Richard,	*Gilman,*	Mechanical Engineering.
Manny, Fred Hugh,	*Mound Station,*	Natural Science.
Marsh, Loren William,	*Joliet,*	Electrical Engineering.
Marsh, Norman Foote,	*Upper Alton,*	Architecture.
Matteson, Victor André,	*Evanston,*	Architecture.
Mesiroff, Josef,	*Chicago,*	Mechanical Engineering.
Millar, Adam Vanse,	*Mattoon,*	Civil Engineering.
Murphy, Francis Joseph,	*Rock Island,*	Chemistry.
Muse, Ernest,	*Metropolis,*	Architecture.
Nelson, Fred Irwin,	*Buda,*	Electrical Engineering.
Newcomer, Paul William,	*Petersburg,*	Chemistry.
Noble, Robert William,	*Champaign,*	Chemistry.
Ogiwara, Chijokichi,	*Tokio, Japan,*	Mechan. Engineering.
Olmsted, Roy,	*Prophetstown,*	Elec. Engineering.
Osgood, Harry Haviland,	*Lostant,*	Natural Science.
Paine, Arthur Elijah,	*Rosemond,*	Classical.
Parr, John Louis,	*Wyoming, Wis.,*	Architecture.
Pattison, Samuel Lowry,	*Indianapolis, Ind.,*	Elec. Engineering.
Pepper, William Allen,	*Joliet,*	Electrical Engineering.
Peterson, Martin,	*Englewood,*	Architecture.
Perry, James Alfred	*Woodstock,*	Mechanical Engineering.

Philips, Thomas Lewis,	*Belvidere*,	Civil Engineering.
Pirkins, Reed Miles,	*Springfield*,	Latin.
Pitney, Clarence Orville,	*Augusta*,	Natural Science.
Pohlman, John Edward,	*Joliet*,	Civil Engineering.
Poole, Edward Warren,	*Dover*,	Electrical Engineering.
Meyer, Harry,	*Davenport, Ia.*,	Mechanical Eng.
Porter, Horace Chamberlain,	*Champaign*,	Classical.
Ray, George Joseph,	*El Paso*,	Civil Engineering.
Rayburn, Charles Clyde,	*Roseville*,	Chemistry.
Rutherford, Cyrus Wilson,	*Newman*,	Pharmacy.
Sachse, Edward George,	*Morris*,	Electrical Engineering.
Sammis, John Langley,	*Jacksonville*,	Chemistry.
Saunders, Rome Clark,	*Champaign*,	Electrical Engineering.
Sayers, William Wesley,	*Champaign*,	Mechanical Eng.
Schacht, Frederick William,	*Moline*,	Natural Science.
Schroeder, John Lewis,	*Davenport, Ia.*,	Electrical Eng.
Schultz, Arthur Ernest,	*Olney*,	Electrical Engineering.
Searing, Charles Aaron,	*Oak Park*,	Architecture.
Shepardson, Ralph Steele,	*Aurora*,	Architecture.
Sherman, Cecil Harvey,	*Elgin*,	Architecture.
Sherrill, Walter Dickens,	*Colona*,	Architecture.
Simmons, Norton Andrews,	*Brighton*,	Electrical Engineering.
Smith, Bruce,	*Newman*,	Latin.
Spurgin, Isaac Meigs,	*Urbana*,	English and Mod. Lang.
Staley, William Theron,	*Urbana*,	English and Mod. Lang.
States, William Daniel,	*Elwood*,	Mechanical Engineering.
Stebbins, Will Theodore,	*Battle Creek, Mich.*,	Electrical Eng.
Steinwedell, George Otto,	*Quincy*,	Electrical Engineering.
Stoolman, Almond Winfield Scott,	*Champaign*,	Natural Science.
Strawn, John Harris,	*Albion*,	Classical.
Street, Lester Chapin,	*Dixon*,	Civil Engineering.
Taylor, George Terry,	*Urbana*,	Electrical Engineering.
Terry, Charles Dutton,	*Kewanee*,	Mechanical Engineering.
Thornhill, Charles Calaware,	*Champaign*,	Mechanical Eng.
Todd, Hiram Eugene,	*Kankakee*,	English and Mod. Lang.
Trogdon, James Edmund,	*Paris*,	Electrical Engineering.
Vail, Richard Hart,	*Kewanee*,	Chemistry.
Vail, Richard Randolph,	*Lone Tree*,	Civil Engineering.
Vigal, William Myron,	*Edinburg*,	Electrical Engineering.
Voigt, Charles Bernard,	*Mattoon*,	English and Mod. Lang.
Wade, Thomas Brian,	*Champaign*,	Natural Science.

Wallace, Herbert Milford,	*Chicago*,	Agriculture.
Webber, Hubert Anthony,	*Mt. Vernon*,	Architecture.
Wheldon, Clarence Sutton,	*Emporia, Kan.*,	Electrical Eng.
Willett, William Marble,	*Yorkville*,	Electrical Engineering.
Wingard, Lewis Forney,	*Champaign*,	Architectural Eng.
Young, Charles Whittier,	*Tracy*,	Natural Science.
Young, John Hayes,	*Tracy*,	Electrical Engineering.
Alpiner, Amelia Darling,	*Kankakee*,	English and Mod. Lang.
Brownlee, Mary Lavinia,	*Urbana*,	Latin.
Buck, Luella Eugenia,	*Champaign*,	Natural Science.
Burt, Lula,	*Urbana*,	English and Mod. Lang.
Chester, Florence,	*Champaign*,	Natural Science.
Chester, Mary,	*Champaign*,	Natural Science.
Cleland, Blanche Keeney,	*Rock Island*,	Architecture.
Dewey, Louise Sarah,	*Urbana*,	Natural Science.
Hartman, Fanny Taylor,	*Ft. Wayne, Ind.*,	Art and Design.
Henry, Maud May,	*Oregon*,	English and Mod. Lang.
Ice, Marinda,	*Gifford*,	English and Mod. Lang.
Ice, Meldora,	*Gifford*,	Architecture.
Kent, Jennie Isabella,	*Urbana*,	English and Mod. Lang.
Kratz, Laura,	*Monticello*,	English and Mod. Lang.
Lindsey, Blanche,	*Onarga*,	English and Mod. Lang.
McFadden, Belle Lorraine,	*Champaign*,	Latin.
O'Brien, Marguerite Helen,	*Champaign*,	Eng. and Mod. Lang.
Powers, Florence Victoria,	*Tiskilwa*,	Art and Design.
Raynor, Clara Mae,	*Champaign*	Classical.
Zilly, Mabel Helen,	*Champaign*,	Eng. and Mod. Lang.

SPECIAL STUDENTS.

Balding, James Palmer,	*Evanston*,	Architecture.
Bates, Charles Edgar,	*Indianapolis, Ind.*,	Architecture.
Dunseth, James Martin,	*Urbana*,	Latin.
Frederickson David Terhune,	*Champaign*,	Eng. and Mod. Lang.
Gründler, Franz,	*Zwickau, Germany*,	Electrical Eng.
Hays, Thomas Smith,	*Champaign*.	Eng. and Mod. Lang.
Martin, John Madison	*Bement*,	Natural Science.
Melluish, George James,	*Bloomington*,	Electrical Engineering.
Nye, Robert,	*Moline*,	Municipal Engineering.
Postlethwaite, Francis William Henry,	*Toronto, Canada*,	Electrical Eng.
Riley, George Washington,	*Champaign*,	Art and Design.

Sheppard, Samuel Henry,	*Jacksonville*,	Pharmacy.
Smolt, Alfred Ernest,	*Paw Paw*,	Pharmacy
Vandeventer, Homer Givens,	*Mt. Sterling*,	Agriculture.
Wolcott, James Thompson,	*Peoria*,	Chemistry.
Wurdeman, Charles,	*Columbus, Neb.*,	Architecture.
Barnard, Alice Sarah,	*Chicago*,	English and Mod. Lang.
Brownlee, Elizabeth Emma,	*Urbana*,	English and Modern Lang.
Campbell, Mary,	*Urbana*,	Art and Design.
Carter, Carrie Mabel,	*Champaign*,	Art and Design.
Chambers, Gertrude,	*Sadorus*,	Music.
Chester, Edith,	*Champaign*,	Art and Design.
Clendenin, Adelle,	*Cairo*,	English and Modern Lang.
Creamer, Alice Carey,	*Washington C.H., O.*,	En. & Mod. Lan.
Grinnell, Jessie Claire,	*Mayfair*,	Art and Design.
Havard, Jennie,	*Urbana*,	Music.
Heath, Bessie,	*White Heath*,	Eng. and Mod. Lang.
Hughey, Marie Lorie,	*Hillsboro, O.*,	Eng. and Mod. Lang.
Leal, Mary Cloelia,	*Urbana*,	Art and Design.
Lewis, Lela J,	*Santa Monica, Cal.*,	Art and Design.
McIntosh, Mabel Charlotte Urquhart,	*Champaign*,	Eng. and Mod. Lang.
McIntosh, Winifred Wilhelmina Stuart,	*Champaign*,	Eng. and Mod. Lang.
Phelps, Grace Esther,	*Oak Park*,	Eng. and Mod. Lang.
Rapp, Mrs. Jean Morrison,	*Champaign*,	Art and Design.
Roysdon, Grace Elizabeth,	*Champaign*,	Art and Design.
Sherfy, Fannie Belle,	*Champaign*,	Physical Culture.
Sims, Ona Neosho,	*Champaign*,	Music.
Spry, Zua,	*Sidell*,	Classical.
Van Patten, Hanna,	*Steward*,	English and Modern Lang.
Walker, Cora Elizabeth,	*St. Joseph*,	English and Mod. Lang.
Woody, Jamie E,	*Champaign*,	Art and Design.

PREPARATORY SCHOOL.

Aaron, Philip Judy,	*Big Neck*,	Civil Engineering.
Appel, Henry Lewis,	*Chicago*,	Architecture.
Armstrong, James Ellis,	*Bondville*,	Eng. and Mod. Lang.
Bagshaw, William Leroy,	*Winchester*,	Electrical Engineering.
Bassett, William Murray,	*Champaign*,	Eng. and Mod. Lang.
Beal, Alvin Casey,	*Mt. Vernon*,	Agriculture.
Beckman, Will,	*Arthur*,	Latin.

Beekman, Jonathan Colby,	*Tallula*,	Civil Engineering.
Benham, Fred Henry,	*Lincoln*,	Mechanical Engineering.
Blake, Burton Aaron,	*Tiskilwa*,	Architecture.
Boggs, Oliver Carter,	*Urbana*,	Eng. and Mod. Lang.
Bone, Hugh Alvin,	*Bethany*,	Classical.
Bosworth, Carroll Arthur,	*Chicago*,	Civil Engineering.
Boyles, Rice,	*Louisville*,	Classical.
Brockman, John,	*Davenport, Ia.*,	Electrical Eng.
Brown, Arthur Artemas,	*Champaign*,	Mechanical Engineering.
Brown, Louis Sylvester,	*Butler*,	Eng. and Mod. Lang.
Bunn, Walter Pennington,	*Golconda*,	Chemistry.
Byrne, Lee,	*Minneota, Minn.*,	Classical.
Campbell, Clinton Oliver,	*Champaign*,	Classical.
Carter, Henry Clay,	*Buck Creek, Ind.*,	Architecture.
Clark, Howard Wallace,	*Quincy*,	Architecture.
Coghlan, Graham,	*Philadelphia*,	Electrical Engineering.
Connell, Richard,	*Delavan*,	Architecture.
Costello, Don,	*Freeburg*,	Natural Science.
Curtis, William,	*Delavan*,	Electrical Engineering.
Davis, Philip Henry,	*Rock Falls*,	Architectural Eng.
Dighton, William,	*Monticello*,	Natural Science.
Dill, Arthur Williams,	*Richmond, Ind.*,	Architecture.
Donoghue, Charles Richard,	*La Salle*,	Latin.
Eaton, Horace David,	*Champaign*,	Pharmacy.
Edson, George Edmund,	*Chicago*,	Civil Engineering.
Evans, Ray,	*El Paso*,	Mechanical Engineering.
Forbes, Stuart Falconer,	*Urbana*,	Architecture.
Forman, Charles William,	*Nashville*,	Eng. and Mod. Lang.
Francis, Edmund Carlton,	*Austin*,	Architecture.
Frazier, Elmer Allen,	*Champaign*,	Electrical Engineering.
Gardner, Frank Arthur,	*Osceola*,	Electrical Engineering.
Gardner, Samuel Boon,	*Utica*,	Electrical Engineering.
Gebbie, Frank Kelsoe,	*Mascoutah*,	Electrical Engineering.
Gordy, Alva Nelson,	*Philo*,	Eng. and Mod. Lang.
Graham, George Woods,	*Freeport*,	Electrical Engineering.
Greb, George,	*Springfield*,	Civil Engineering.
*Grinnell, John Cornelius,	*Mayfair*,	Electrical Engineering.
Grussing, John,	*Cissna Park*,	Civil Engineering.
Haggard, William Thomas,	*Farmer City*,	Mechanical Eng.
Hall, Seymour Elbridge,	*Champaign*,	Eng. and Mod. Lang.

*Deceased.

Hamm, Ira Lewis,	*El Paso*,	Mechanical Engineering.
Hammers, Jesse,	*Champaign*,	Classical.
Haseltine, Theodore Lorraine,	*Aurora*,	Eng. and Mod. Lang.
Haws, Joel,	*Magnolia*,	Pharmacy.
Hay, Mark,	*Chicago*,	Architecture.
Hayes, Albert Leslie,	*Galva*,	Mechanical Engineering.
Hayes, James Benjamin,	*Riverton*,	Chemistry.
Helbling, Louis Ferdinand,	*Champaign*,	Electrical Engineering.
Helton, Alfred Joseph,	*Atwood*,	Eng. and Mod. Lang.
Henninger, Carl Gustave,	*Eddyville, Ia.*,	Architecture.
Herman, John Newton,	*Freeburg*,	Electrical Engineering.
Herwig, Fred William,	*Mason City*,	Mechanical Engineering.
Hill, Irwyn Horatio,	*Joliet*,	Architecture.
Holden, James Allen,	*Aurora*,	Mechanical Engineering.
Hunter, Benjamin Aikens,	*Rockford*,	Mechanical Engineering.
Hurd, Arthur Burton,	*El Paso*,	Mechanical Engineering.
Jackson, William John,	*Chicago*,	Electrical Engineering.
Jones, Maurris M,	*Fisher*,	Eng. and Mod. Lang.
Kaeser, Albert Fred,	*Highland*,	Natural Science.
Kennard, Edward Morrison,	*Champaign*,	Civil Engineering.
Key, David Francis Scott,	*Carbondale*,	Electrical Engineering.
Kittner, Ferdinand B,	*Defiance, O.*,	Civil Engineering.
Kruse, Conrad Fred,	*Davenport, Ia.*,	Architecture.
Leidendeker, Albert Richard,	*Champaign*,	Civil Engineering.
Lloyde, Clifford Luther,	*Champaign*,	Natural Science.
Lowes, Forrest Mitchison,	*Genesee*,	Latin.
McConney, Porter David,	*Indianapolis, Ind.*,	Mechanical Eng.
McCormick, Olin,	*Gibson City*,	Electrical Eng.
McIntire, Merton Pearson,	*Neponset*,	Electrical Engineering.
McMillan, Frederick Routt,	*Jacksonville*,	Electrical Eng.
Marker, William Franklin,	*Champaign*,	Mechanical Eng.
Marx, Maurice,	*Nashville*,	Electrical Engineering.
Masten, George,	*Woonsocket, S. D.*,	Eng. & M. Lan.
Mellen, Earnest Roy,	*Amboy*,	Electrical Engineering.
Miner, Earl Henry,	*Winchester*,	Electrical Engineering.
Moore, Dwight Merritt,	*Monticello*,	Electrical Engineering.
Morse, Robert Pope,	*Indianapolis, Ind.*,	Architecture.
Morrissey, Matthew James,	*Champaign*.	Chemistry.
Muller, Albert Charles,	*Chicago*,	Architecture.
Muse, William Osborne,	*Jacksonville*.	Civil Engineering.
Nicholson, James Calvin,	*Litchfield*,	Mechanical Eng.

O'Donnell, Patrick Henry,	*Belvidere*,	Latin.
Olson, Jesse Mathias,	*Seneca*,	Latin.
O'Rourke, Eugene James,	*La Salle*,	Electrical Engineering.
Onstott, Hiley Hiram,	*Du Quoin*,	Eng. and Mod. Lang.
Parker, George Arthur,	*Champaign*,	Chemistry.
Parker, Walter Asbury,	*Decatur*,	Natural Science.
Peoples, John Vanralzah,	*La Junta, Colo.*,	Electrical Eng.
Perrett, Galen Joseph,	*Chicago*,	Electrical Engineering.
Perrett, Irving Thomas,	*Chicago*,	Electrical Engineering.
Phillips, William Oliver,	*Chicago*,	Architecture.
Plym, Francis John,	*Aledo*,	Architecture.
Piatt, Jay Cantrell,	*Clarion*,	Chemistry.
Pixley, Arthur Homer,	*Ingraham*,	Electrical Engineering.
Price, Charles Jacob,	*Forreston*,	Natural Science.
Prince, Henry Adelbert,	*East Syracuse, N. Y.*,	Architecture.
Ratz, Gustavus George,	*Red Bud*,	Agriculture.
Reinhart, Julius Emil,	*Chicago*,	Mechanical Engineering.
Rice, Fred Lee,	*Champaign*,	Eng. and Mod. Lang.
Richards, Clarence Morgan,	*Urbana*,	Mechanical Engineering.
Richmond, Shannon Alexander,	*St. Joseph, Mo.*,	Chemistry.
Ritchie, Andrew,	*Foosland*,	Electrical Engineering.
Rodgers, Leon,	*Riverton*,	Civil Engineering.
Roysdon, Emmett Russell,	*Champaign*,	Natural Science.
Schaad, Thomas Ferdinand,	*Chandlerville*,	Agriculture.
Schneck, Sereno,	*Mt. Carmel*,	Natural Science.
Schneiter, Samuel,	*Paxton*,	Eng. and Mod. Languages.
Schuyler, James Chauncey,	*Sycamore*,	Mechanical Engineering.
Seass, Louie Dexter,	*Urbana*,	Mechanical Engineering.
Shaffer, Robert Lyman	*Neoga*,	Electrical Engineering.
Shless, Charles,	*Chicago*,	Eng. and Mod. Languages.
Sloan, John Francis,	*Brimfield*,	Eng. and Mod. Lang.
Spaulding, Robert Limbert,	*Villa Ridge*,	Electrical Engineering.
Smith, Fred McClellan,	*Virginia*,	Latin.
Smith, John Cummings,	*Pekin*,	Electrical Engineering.
Stone, Albert James,	*Quincy*,	Electrical Engineering.
Sumner, William Thompson,	*Emden*,	Eng. and Mod. Languages.
Tatman, Frank,	*Farmer City*,	Mechan. Engineering.
Thompson, Guy Andrew,	*Steward*,	Eng. and Mod. Lang.
Trevett, Ross Lannington,	*Champaign*,	Electrical Engineering.
Turner, Clyde Briggs,	*Atlanta*,	Mechanical Engineering.
Twyman, Frank,	*Macomb*,	Electrical Engineering.

Uppendahl, Willie John,	*Dalton City*,	Eng. and Mod. Lang.
Van Patten, Seth Fields,	*Steward*,	Latin.
von Oven, Frederick William,	*Naperville*,	Civil Engineering.
Voris, Alvin Coe,	*Neoga*,	Electrical Engineering.
Walker, Rufus, Jr.,	*Moline*,	Eng. and Mod. Lang.
Walsh, John Henry,	*Ivesdale*,	Civil Engineering.
Webber, Arthur,	*Galatia*,	Pharmacy.
Webster, William W,	*Philo*,	Mechanical Engineering.
Weeks, Charles Henry,	*Upper Alton*,	Architecture.
Wiley, Leo,	*Paris*,	Electrical Engineering.
Williamson, Albert St. John,	*Quincy*,	Electrical Engineering.
Wilmot, Arthur Xenophon,	*La Prairie Center*,	Electrical Eng.
Winslow, Charles Erastmus,	*Freeport*,	Electrical Engineering.
Winslow, Fred Albert,	*Freeport*,	Electrical Engineering.
Wray, David Couden,	*Elida*,	Mechanical Engineering.
Zink, George,	*Litchfield*,	Chemistry.
Bailey, Gertrude Hannah,	*Long View*,	Eng. and Mod. Lang.
Bassett, Minnie,	*Champaign*,	Eng. and Mod. Laag.
Bennett, Orpha Adelia,	*Milford Center, O.*,	Latin.
Berry, Edna May,	*Urbana*,	Classical.
Berry, Floy Elaine,	*Urbana*,	Classical.
Boyd, Bertha Marion,	*Roseville*,	English and Mod. Lang.
Busey, Laura,	*Urbana*,	English and Mod. Lang.
Busey, Marietta Ruth,	*Urbana*,	Latin.
Campbell, Maude Permill,	*Champaign*,	Natural Science.
Frazey, Alice Belle,	*Urbana*,	Classical.
Frazier, Della Purl,	*Champaign*,	Eng. and Mod. Lang.
Hanson, Mattie Alice,	*Urbana*,	Art and Design.
Hammers, Lillian,	*Champaign*,	Eng. and Mod. Lang.
Irwin, Blanche B.,	*Long View*,	Eng. and Mod. Lang.
Kerns, Mazie White.	*Champaign*,	Natural Science,
Morrow, Grace Eliot,	*Champaign*,	Natural Science.
Owens, Daisie Margaret,	*Urbana*,	Natural Science.
Ray, Maude Lucille,	*Champaign*,	Eng. and Mod. Lang.
Somers, Mabel Carson,	*Urbana*,	English and Mod. Lang.
Wilson, Grace,	*Penfield*,	English and Mod. Lang.
Wright, Marion,	*Urbana*,	English and Mod. Lang.

FREE COURSE IN AGRICULTURE STUDENTS.

Coolidge, Arthur Earle,	Galesburg.
Funk, Arthur Correll,	Bloomington.
Haire, Dodd William,	Divernon.
Hall, Fred Fay,	Champaign.
Heath, Noble Porter,	White Heath.
Hollensbe, Alvin Orin,	Champaign.
Hyde, Charles B,	Rising.
McCluer James Warren,	Farina.
Malady, Thomas Edward,	Seneca.
Morrison, William Marshall,	Leeds, Wis.
Nottinger, Dale Roy,	Plainfield.
Pallissard, Armand,	St. Anne.
Pratt, George Wallace,	Staley.
Quanté, Hiram Henry,	Metropolis.
Shoot, Clarence W,	Charleston.
Simpson, William Neil,	Farmington.
Skinner, George,	Urbana.
Sparks, George,	Urbana.
Tomlin, Isaac Funk,	Pleasant Plains.
Travis, Abraham,	Womac.
Twohig, Joseph,	Delavan.
Upperman, William Walter,	Cowden.
Van Dervoort, William,	Ellsworth.
Walker, William Leonard,	Odell.
Ware, Walter Scott,	Mahomet.

SUMMARY.

Courses and Classes.	University.										Preparatory School.			University and Preparatory School.	
	Graduate School	Resident Graduates	Seniors	Juniors	Sophomores	Freshmen	Specials	Total Men	Total Women	Total	Men	Women	Total	Total Men	Total
Agriculture, Men	1	..	1	..	...	2	1	5	..	5	3	...	3	8	8
Mechanical Eng., Men	..	..	3	11	18	16	..	48	..	48	19	...	19	67	67
Electrical Eng., Men	..	2	11	7	23	38	3	84	..	84	39	...	39	123	123
Civil Eng., Men	2	2	14	22	19	14	..	73	..	73	13	...	13	86	86
Mining Eng., Men	..	..	1	1	...	...	..	2	..	2	....	....	....	2	2
Municipal and Sanitary Eng., Men	..	..	..	2	2	...	1	5	..	5	....	....	....	5	5
Architecture, Men	1	3	18	8	18	29	2	79	..	81	19	..	19	98	100
Architecture, Women	..	..	..	..	..	2	..	...	2		....	..	....	....	2
Architectural Eng., Men	..	..	1	5	3	4	..	13	..	13	1	...	1	14	14
Chemistry, Men	1	..	8	10	5	11	1	36	..	37	7	...	7	43	44
Chemistry, Women	..	..	..	..	1	...	..	...	1		....	...	....	....	1
Pharmacy, Men	..	..	..	..	3	2	2	7	..	7	3	...	3	10	10
Natural History, Men	1	1	14	4	7	17	1	45	..	62	8	...	12	53	74
Natural History, Women	..	..	2	9	2	4	..	...	17		....	4		....	21
English and Modern Languages, Men	1	1	6	12	7	12	2	41	..	79	22	...	33	63	112
English and Modern Languages, Women	2	2	3	3	8	9	11	...	38		....	11		....	49
Latin, Men	..	..	3	..	...	4	2	9	..	18	6	...	8	15	26
Latin, Women	..	..	3	1	3	2	..	...	9		....	2		....	11
Classical, Men	1	..	3	2	4	6	..	16	..	21	5	...	8	21	29
Classical, Women	..	..	1	2	...	1	1	...	5		....	3		....	8
Art and Design, Men	..	..	..	..	...	...	1	1	..	13	....	..	....	1	14
Art and Design, Women	..	1	.	..	...	2	9	...	12		....	1	1	....	13
Music, Women	..	..	..	..	...	...	3	...	3	3	....	...	...	....	3	3
Physical Culture, Women	..	..	..	..	...	...	1	...	1	1	....	...	....	....	1	1
Total, Men	8	9	83	84	109	155	16	464	..	....	145	...	....	609	....	.....
Total, Women	2	3	9	15	14	20	25	...	88	....	....	21	....	....	109	.....
Total	10	12	92	99	123	175	41	...	..	552	....	...	166	....	....	718

Adding to the number enumerated above the 25 men who attended the one term course in Agriculture gives—

Total in attendance during the year 1893-4.....743.

HOLDERS OF SCHOLARSHIPS, PRIZES AND COMMISSIONS.

HONORARY SCHOLARSHIPS.

Adams,	Steinwedell, George Otto.
Carroll,	Carpenter, Hubert Vinton.
Champaign,	Marble, Harry Curtis.
Clay,	Campbell, George Henry.
Clinton,	Webster, Sallie E.
Coles,	Millar, Adam Vanse.
Cook,	Bailey, Leonard Lionel.
Crawford,	Templeton, Benjamin Franklin.
Douglas,	Carmack, Clyde Robert.
Du Page,	Heideman, George Herman.
Edwards,	Strawn, John Harris.
Hancock,	Ketchum, Richard B.
Jefferson,	Webber, Hubert Anthony.
Kane,	Shepardson, John E.
La Salle,	Sparks, Marion E.
Livingston,	Holtzman, Stephen F.
Marion,	Row, George S.
Menard,	Newcomer, Joseph Hardin.
Ogle,	Woolsey, Ola C.
Peoria,	Beasley, Harrison E.
Rock Island,	Schacht, Frederick William.
Sangamon,	Porter, Robert K.
Tazewell,	Van Orstrand, Charles E.
Whiteside,	Reeves, Harley E.
Will,	Barr, George A.
Winnebago,	Carpenter, Frank A.
Woodford,	Burroughs, Edward.

ACCREDITED SCHOOL SCHOLARSHIPS.

Elgin High School, Hobart, Albert Claude.

CHICAGO CLUB LOAN FUND.

Mesiroff, Josef.

WINNERS IN JUNIOR PRIZE SPEAKING CONTEST.

Parry, Joseph Lawrence, First Prize. Woolsey, Ola C, Second Prize.

COMMISSIONED BY THE GOVERNOR AS CAPTAINS BY BREVET IN THE ILLINOIS NATIONAL GUARD, 1893.

Craig, Edward Chilton, Earl, Mark Alden.
Graham, William Johnson, Spalding, Fred Milton.
Stewart, John Truesdale.

The following have been named to the Secretary of War as worthy of special commendation:
Earl, Mark Alden, Spalding, Fred Milton,
Stewart, John Truesdale.

ROSTER OF OFFICERS AND NON-COMMISSIONED OFFICERS. OF THE BATTALION FOR 1893-94.

Adjutant, Captain C. W. Noble.
Sergeant-Major, H. R. Marsh.

Co. A—Captain, W. N. Vance; 1st Sergeant, F. H. Green; Sergeant, W. C. Brenke; Corporals, L. I. Brower, G. L. Grimes, C. D. Gulick, H. Graham, M. Peterson.

Co. B—Captain, A. M. Munn; 1st Sergeant, G. H. Scott; Sergeant, G. E. Row; Corporals, F. C. Beem, G. W. Herwig, J. E. Trogdon, J. C. Barnhart.

Co. C—Captain, H. E. Reeves; 1st Sergeant, R. P. Brower; Sergeant, R. P. Manard; Corporals, C. W. Leigh, W. M. Vigal, H. C. Eaton, T. J. Klossowski.

Co. D—Captain, E. V. Capps; 1st Sergeant, R. K. Porter; Sergeant, C. A. Risor; Corporals, J. L. Sammis, C. W. Young, L. C. Street, W. N. Eichberg.

Co. E—Captain J. E. Shepardson; 1st Sergeant, J. H. McKee; Sergeant, J. J. Dubsky; Corporals, H. C. Porter, A. E. Paine, A. E. Schultz, F. J. Murphy, C. O. Keuhne.

Co. F—Captain, J. A. Green; 1st Sergeant, G. A. Howard; Corporals, J. H. Young, H. C. Coffeen, O. T. Wills, W. T. Stebbins, A. Graham.

Artillery Detachment—Captain, L. A. MacGregor; 1st Sergeant, W. T. Pierce; Corporals, A. C. Hobart, G. F. Anderson.

Band—C. M. Lewis, Drum Major; W. L. Steele, Leader.

1894.

SEPTEMBER.

S	M	T	W	T	F	S
..	..	..	..	..	..	1
2	3	4	5	6	7	8
9	10	11	12	13	14	15
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30	..	..	..	..	..	..

OCTOBER.

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NOVEMBER.

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DECEMBER

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1895.

JANUARY.

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FEBRUARY.

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MARCH.

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APRIL.

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1895.

MAY.

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JUNE.

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JULY.

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AUGUST.

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1895.

SEPTEMBER.

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OCTOBER.

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20	21	22	23	24	25	26
27	28	29	30	31	..	..
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NOVEMBER.

..	..	..	..	..	1	2
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10	11	12	13	14	15	16
17	18	19	20	21	22	23
24	25	26	27	28	29	30
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DECEMBER.

1	2	3	4	5	6	7
8	9	10	11	12	13	14
15	16	17	18	19	20	21
22	23	24	25	26	27	28
29	30	31	..	..	..	..
.	..	..	..	..	..	..

THE UNIVERSITY CALENDAR.

1894-95.

FALL TERM—1894.

Sept. 6, Thursday.	Entrance examinations begin.
Sept. 10, 11, Monday and Tuesday.	Registration Days.
Sept. 12, Wednesday.	Instruction begins.
Nov. 5, Monday.	Latest date for announcing Subjects of Theses for Baccalaureate Degrees.
Nov. 29, Thursday.	Thanksgiving Recess.
Dec. 3, Monday.	Instruction resumed.
Dec. 17, Monday.	Term Examinations begin.
Dec. 19, Wednesday.	Term ends.

WINTER TERM—1895.

Jan. 7, Monday.	Entrance Examinations.
Jan. 7, 8, Monday and Tuesday.	Registration Days.
Jan. 9, Wednesday.	Instruction begins.
March 25, Monday.	Term Examinations begin.
March 27, Wednesday.	Term ends.

SPRING TERM—1895.

March 25, 26, 27, Monday, Tuesday and Wednesday.	Registration Days.
March 28, Thursday.	Instruction begins.
April 27, Saturday.	Latest day for presenting Commencement Theses and Orations.

May 27, Monday.	Hazleton Prize Drill.
May 28, Tuesday.	Competitive Drill.
May 30, Thursday.	Senior Examinations begin.
June 5, Wednesday.	Term Examinations begin.
June 9, Sunday.	Baccalaureate Address.
June 10, Monday.	Class Day.
June 11, Tuesday.	Alumni Day.
June 12, Wednesday.	Twenty-fourth Annual Commencement.

FALL TERM—1895.

Sept. 5, Thursday.	Entrance Examinations begin.
Sept. 9, 10, Monday and Tuesday.	Registration Days.
Sept. 11, Wednesday.	Instruction begins.
Nov. 4, Monday.	Latest Date for Announcing Subjects of Theses for Baccalaureate Degrees.
Nov. 28. Thursday.	Thanksgiving Recess.
Dec. 2, Monday.	Instruction resumed.
Dec. 19, Thursday.	Term Examinations begin.
Dec. 20, Friday.	Term ends.

INDEX.

Accredited Schools....157
Accredited School Scholarships....150
Admisson....153
Agricultural Experiment Station....6, 12
Agriculture....21, 25, 87
  Free Short Course in....30
  Junior Course in....29
Anthropology....87
Architectural Engineering....44
Architecture....42, 88
Art and Design....70, 95
Art Gallery....22
Astronomy....58, 74, 97
Attendance....17
Bacteriology....100
Board of Trustees....5
Botany....20, 51, 99
Buildings and Grounds....17
Calendar....197
Chemical Group....53
Chemistry....101
Chicago Club Loan Fund....151
Choice of Studies....160
Civil Engineering....39, 105
College of Agriculture....25
College of Engineering....31
College of Literature....66
College of Science....46
Commissions....162, 194
Computing Apparatus....33
County Superintendents' Certificates....157
Degrees....77, 163
Descriptive Geometry....113
Economics....64, 71, 109
Electrical Engineering....37, 110
Engineering Hall....Frontispiece
English....71, 111
Entomology....147
Examinations, Entrance....153
  Term....162
Expenses....164, 165
Faculty....7
Fellowships....152
Forrestry....119
French....76, 142
General Biology....112
General Engineering Drawing....113
Geology....20, 52, 113
German....71, 115
Graduate School....77
Greek....72, 116
Hazelton Prize Medal....149
History....72, 118
Honorary Scholarships....150
Horticulture....119
Hydraulics....145
Italian....76, 143
Laboratories....23, 33
Latin....73, 120
Lettering....113
Library....22
Lithology....20
Materia Medica....146
Mathematical Group....58
Mathematics....58, 73, 121
Mechanical Engineering....24, 25, 126
Metallurgy....104
Meteorology....129
Military Science....130, 161
Military Scholarships....161
Mineralogy....20, 52, 130
Municipal and Sanitary Engineer'g, 41, 131
Museums and Collections....19
Music....132
Natural Science Group....48
Officers of Battalion....194
Oral Rhetoric and Oratory....74, 133
Pedagogy....64, 75, 133
Pharmacy....56, 135
Philosophical Group....62
Philosophy....64, 76, 136
Physical Culture, for Men....162
  For Women....138, 162
Physics....21, 34, 58, 138
Physiology....52, 139
Political Science....140
Preparatory School....166
Prizes and Scholarships....149
Psychology....65, 76, 141
Registration....160
Regulations and Administration....153
Romance Languages....76, 142
Scholarships....149
Societies....152
Spanish....76, 144
State Laboratory of Natural History....12
Students, List of....172
  Summary of....192
Summer School....82
Theoretical and Applied Mechanics.33, 144
University Extension....86
University of Illinois, History....13
Veterinary Science....145
Zoölogy....19, 52, 146

Learning and Labor

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OF THE

UNIVERSITY OF ILLINOIS

(Postoffice, Champaign or Urbana, Ill.)

1894-95

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PUBLISHED BY THE UNIVERSITY

Illinois is an imperial State: the brightest gem in her crown should be, and may be, the University that bears her name.—*T. J. Burrill.*

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UNIVERSITY OF ILLINOIS.

The University of Illinois has its seat in Champaign county, in the eastern central part of the state, between the cities of Champaign and Urbana, within the corporate limits of the latter. It is one hundred and twenty-eight miles southward from Chicago, at the junction of the Illinois Central, the Cleveland, Cincinnati, Chicago and St. Louis, and the Wabash railroads. The situation is a beautiful one, and the "art that doth mend nature" has added rare charms to the grounds and surroundings. The country around is one of the richest and most prosperous agricultural regions of the world, and the local municipalities, with a combined population of 11,000, are noted for public spirit and high moral tone.

HISTORY.

In 1862 the national government donated to each state in the Union public land scrip apportioned in quantity equal to 30,000 acres for each senator and representative in congress, "for the endowment, support, and maintenance of at least one college, whose leading object shall be, without excluding other scientific and classical studies, and including military tactics, to teach such branches of learning as are related to agriculture and the mechanic arts, * * * * in order to promote the liberal and practical education of the industrial classes in the several pursuits and professions of life.

Under this act Illinois received scrip for 480,000 acres of land subject to location in any surveyed but unoccupied part of the public domain, and 25,000 acres were thus located in Nebraska and Minnesota, while the remainder of the scrip was sold for what could be obtained. Of the land, about 14,000 acres have been sold at from $10.00 to $15.00 an acre. In compensation for waiting something more than a quarter of a century, the land thus secured will add to the endowment fund nearly as much as was obtained for the vastly greater proportion of the scrip originally sold. The entire principal sum received from the sale of scrip

and of land is to be held inviolate as endowment, the income only being available for current expenditures.

To secure the location of the University several counties entered into a sharp competition by proposing to donate to its use named sums of money, or their equivalent. Champaign county offered a large brick building, erected for a seminary and nearly completed, about 1,000 acres of land for a campus and adjoining farms, and $100,000 in county bonds. To this the Illinois Central railroad added $50,000 in freight.

The state legislature has from time to time appropriated various sums for permanent improvements, as well as for maintenance. The present value of the entire property and assets is estimated at $1,400,000.

The institution was incorporated under the name of the Illinois Industrial University the last day of February, 1867, and placed under the control of a board of trustees constituted of the governor, the superintendent of public instruction, and the president of the state board of agriculture, as *ex-officio* members, and twenty-eight citizens appointed by the governor. The chief executive officer, usually called president, was styled regent, and he was made, *ex officio*, a member of the board and presiding officer both of the board of trustees and of the faculty.

In 1873 the board of trustees was reorganized by the reduction of the number of members by appointment to nine and *ex officio* to two, the governor and the president of the state board of agriculture. In 1887 a law was passed making membership elective at a general state election and restoring the superintendent of public instruction as an *ex-officio* member. There are, therefore, now three *ex-officio* members and nine by public suffrage. Since 1873 the president of the board has been chosen by the members thereof from among their own number, for a term of one year.

In consideration of the offer of Champaign county the institution was located, May 8, 1867, in the suburbs of Urbana, adjoining those of Champaign. For greater convenience most use has been made of the postoffice of the latter place. The University was open to students March 2, 1868, at which time there were present, beside the regent, three professors and about fifty students, mostly from the vicinity. During the first term another instructor was added, and there was a total enrollment of 77 students, all young men.

During the first term classes were instructed in algebra, geometry, natural philosophy, history, rhetoric, and Latin. Along with this, work on the farm and gardens or around the buildings was compulsory for all students. But in March of the next year compulsory labor was discontinued, save when it was made to serve as a part of class instruction. A chemical laboratory was fitted up during the autumn of 1868, and students then began practical work in the department. Botanical laboratory work was commenced the following year. In January, 1870, a temporary mechanical shop was fitted up with tools and machinery, and in this little wooden building, originally constructed for a carpenter shop, was begun the *first shop-instruction* given in any American university. During the summer of 1871, a large brick structure, the present Machinery Hall, was erected and equipped for students' shop work in both wood and iron, and in 1876 a diploma of merit was awarded for the exhibition in this line made at the Centennial Exposition.

By vote, March 9, 1870, the trustees admitted women as students, and during the year 1870-71, twenty-four availed themselves of the privilege. Since that time they have constituted about one-sixth to one-fifth of the total number of students. In 1875 a course in domestic science and art was organized. This was maintained five years, when, upon the withdrawal of the professor in charge, it was abandoned.

By the original state law certificates showing the studies pursued and the attainments in each were substituted for the usual diplomas and degrees. The certificates not proving satisfactory to the holders, the alumni petitioned the legislature in 1877 to give the University authority to confer degrees, and such authority was granted.

Again, upon motion of members of the alumni, seconded by trustees and faculty, the legislature was asked in 1885 to change a former action by that body. The word *industrial*, as used in connection with public institutions, had become associated with those of a penal or reformatory kind, and, in consequence, many ludicrous and sometimes embarrassing mistakes were made as to the character and purpose of the University. Instead of the splendid conception of high, collegiate education, preparatory to and in aid of the great industries of the age, people were too often led to suppose the state had provided a place for destitute children or for young culprits. From the

beginning the institution had been recognized as the state University, and all the discussion leading to its establishment was based upon this idea. No change was now sought in its character or in its relations, but a name better expressive to the public mind of that character and relation was desired. The industrial University became the University of Illinois.

During the same session of the legislature a bill was passed transferring the State Laboratory of Natural History from the Illinois State Normal University to the University of Illinois. This laboratory was created by law for the purpose of making a natural history survey of the state, with the publication of the results in a series of bulletins and reports, and for the allied purpose of furnishing specimens illustrative of the flora and fauna of the state to the public schools, and to the state museum. For these purposes direct appropriations are made by the legislature from session to session. A large amount of material has been collected and extended publications have been made in both the forms above mentioned.

By an act approved March 2, 1887, the national government appropriated $15,000 per annum to each state for the purpose of establishing and maintaining, in connection with the colleges founded upon the congressonal act of 1862, agricultural experiment stations, "to aid in acquiring and diffusing among the people of the United States useful and practical information on subjects connected with agriculture, and to promote scientific investigation and experiment respecting the principles and applications of agricultural science." Under this provision the Station for Illinois was placed under the direction of the trustees of the University and its grounds were located on the University farm. At least one bulletin of results is published every three months, and they are for gratuitous distribution. Editions of 15,000 copies are now issued.

For the more complete endowment of the state institutions founded upon the act of 1862, the congress of the United States made further appropriations by a supplementary law passed in 1890. Under this enactment each such college or university received the first year $15,000, the second $16,000, and likewise thereafter $1,000 per annum additional to the amount of the preceding year. The annual increase is to continue until the amount reaches $25,000, which sum is then to be paid yearly thereafter. Putting the congressional aids together there is

made an exceedingly encouraging example for the state authorities to imitate. It cannot be said that the Illinois legislature has in the past contributed liberally to the University, but a disposition to do so has been much more manifest in recent sessions of that body. Besides $70,000 for a science building, the 37th General Assembly (1891) appropriated for the use of the University for two years the sum of $65,044.23, and the 38th (1893) passed appropriations for an engineering building, $160,000, and for other purposes for two years $135,700. The total appropriations by the state to the University for all purposes, to date, amount to $879,900.

BUILDINGS AND GROUNDS.

The land occupied by the University and its several departments embraces about 210 acres, including experimental farm, orchards, forest plantation, arboretum, ornamental grounds, and military parade grounds.

University Hall, designed wholly for public uses, occupies three sides of a quadrangle, measuring 214 feet in front and 122 feet upon the wings. The library wing contains in spacious halls the museum of natural history, the library, the art gallery, and the museum of industrial art. The chapel wing contains the chapel, the physical laboratory and lecture room, and rooms occupied by the departments of architecture, and of art and design. In the main front are convenient class rooms, and on the upper floor elegant halls for literary societies.

The Chemical Laboratory is a building 75 by 120 feet, and two stories high, besides well lighted basement and mansard stories. It contains the general laboratories for students, instructors' laboratories, lecture rooms, store rooms, scale rooms, and various apartments for special purposes.

Machinery Hall is of brick, two stories high, 126 feet in length, and 88 feet in width. It contains the machine shop and mechanical wood shop on the second floor, together with tool rooms, pattern room, and stock room. On the first floor is found the forge shop, foundry, wash room; architectural shops for carpentry and cabinet work, furnished with wood working machinery, stock rooms, and the Laboratory of Applied Mechanics and Hydraulics.

Natural History Hall is a handsome building, 134 by 94 feet, with basement, two main stories, and an attic. It is occupied

by the departments of botany, zoölogy, physiology, mineralogy, and geology, for each of which there are laboratories, lecture rooms, and offices.

Military Hall, 100 by 150 feet in one grand hall, gives ample space for company and battalion manœuvers and for large audiences upon special occasions. It is also used as a gymnasium, for which there are dressing rooms with lockers. A bath room is provided.

Engineering Hall was dedicated with appropriate ceremonies on the 15th of November, 1894, and was occupied at the beginning of the winter term. It stands on the north side of Green street, midway between the north and south groups of buildings, facing the latter. It has a frontage of 200 feet, a depth on the wings of 76 feet and 138 feet in the center. The middle wing is 72 feet wide. The first story is of drab sandstone in twelve inch courses, having a tooth-chiseled finish and deeply chamfered horizontal joints. The three upper stories are of buff pressed brick with terra cotta trimmings to match. The interior is slow burning mill construction. The ceiling is paneled Washington fir, and the remainder of the interior finish is oak with bronze trimmings.

The first story of the west and central wings contains the laboratories of the department of electrical engineering, while the east wing is devoted to masonry laboratories and instrument rooms of the department of civil engineering. The central wing of the second story contains the lecture room and the preparation rooms of the department of physics, and the remainder of the floor is used by the departments of civil and municipal engineering for recitation and drawing rooms, cabinets and studies. The middle wing of the third story contains the laboratories of the department of physics, and the side wings the drawing rooms, lecture rooms, cabinets, and studies of the mechanical department. The center portion contains the library, the office, and the faculty parlor. The fourth story is devoted entirely to the department of architecture, and contains drawing and lecture rooms, cabinets, photo studio, and blue print laboratory.

There are, in addition to these buildings, a veterinary hall, a small astronomical observatory, three dwellings, two large barns, and a greenhouse.

ART GALLERY.

The University art gallery was the gift of citizens of Champaign and Urbana. It occupies a beautiful hall, 61 by 79 feet, and the large display of art objects has surprised and delighted all visitors. In sculpture it embraces thirteen full size casts of celebrated statues, including the Lacoön group, the Venus of Milo, etc., forty statues of reduced size, and a large number of busts, ancient and modern, bas reliefs, etc., making over four hundred pieces. It includes also hundreds of large autotypes, photographs, and fine engravings, representing many of the great masterpieces of painting of nearly all the modern schools: also a gallery of historical portraits, mostly large French lithographs of peculiar fineness, copied from the great national portrait galleries of France.

Other collections of special value to art students embrace a large number of casts of ornament from the Alhambra and other Spanish buildings, presented by the Spanish government; a set of casts from Germany illustrating German Renaissance ornament; series of art works from the Columbian Exposition, and large numbers of miscellaneous casts, models, prints, drawings, etc., such as are usually found in the best art schools.

LIBRARY.

The library, selected with reference to the literary and scientific studies required in the several courses, had, March 1, 1895, 27,750 volumes, and about 6,000 pamphlets.

The large library hall is open throughout the day for study, reading, and consulting authorities. It is intended that the use of the library shall largely supplement the class room instruction in all departments. Constant reference is made in classes to works contained in the library, and their study is encouraged or required. On the same floor as the library is the reading room of the University. It contains a considerable number of important dailies, and is well provided with American, English, French, and German papers and periodicals, embracing some of the most important publications in science and art.

The library of the State Laboratory of Natural History is rich in the world's best literature upon biological sciences, and affords advanced students excellent opportunities for work in this line.

The library of the Agricultural Experiment Station has 4,000 volumes and 2,000 pamphlets. This is also accessible to students.

LABORATORIES.

The chemical laboratories occupy a building 75 by 120 feet, four stories high, including the basement and mansard. The basement is used for storage and for work in mining and metallurgy; the first floor has a lecture room, a laboratory for quantitative work for one hundred and fifty students, and several subsidiary rooms: the second floor, its laboratories for qualitative analysis, private work, lecture room, store room, etc.: and on the uppermost floor is the laboratory of the Agricultural Experiment Station, and apartments for photography.

Natural History Hall is occupied with the laboratories and lecture rooms for the work and instruction in botany, zoölogy, physiology, mineralogy, and geology: it also contains the office and equipments of the State Laboratory of Natural History, and of the State Entomologist, as well as the office and library of the Agricultural Experiment Station. There are six laboratory rooms on each of the main floors—sufficient altogether to accommodate two hundred students, besides offering abundant facilities for the private work of the instructors. The laboratory work in these departments constitutes a very large part of the instruction.

The psychological laboratory in Natural History Hall is well provided with apparatus of many different kinds for use in experimental study and research, and with charts and models to aid in instruction. This laboratory is a new one, but has already attracted wide attention and has awakened special interest in the science to which it is devoted.

The physics laboratories are in Engineering Hall. They are well lighted and well arranged, and are provided with all modern conveniences. The equipment is extensive and is suitable for experimental work of a high grade.

The electrical engineering laboratories are partly in Engineering Hall and partly in University Hall. Each room is especially adapted to its distinct purpose. The equipment is very complete, and is well suited for instruction and research.

The testing laboratory, located in Machinery Hall, gives opportunity to students of the College of Engineering to make

various practical experiments and tests, and to prosecute original investigation in the line of their specialties.

The mechanical laboratory occupies a large part of both floors of Machinery Hall, and each of its departments is equipped for practical work by students. There is a large machine shop with hand and machine tools for all the required operations; a pattern shop, a blacksmith shop, a foundry, a boiler room, etc.

The architectural workshops, in the same building with the mechanical laboratory, are fully equipped for bench and lathe work, and are supplied with all essential machine tools. Students become familiar with the tools and the work of the carpenter and cabinet maker, as well as with the draughting operations of the architect's office.

The farms, fruit and forestry plantations, and gardens offer abundant illustrations of the work associated with the courses of instruction in agriculture and horticulture. The varied and carefully conducted operations of the Agricultural Experiment Station afford excellent aids to students in these departments. For its specific purposes there are used about one hundred and seventy acres.

MUSEUMS AND COLLECTIONS.*

The museum of zoölogy and geology occupies a hall 61 by 79 feet, with a gallery on three sides, and is completely furnished with wall, table, and alcove cases. It contains interesting and important collections, specially selected and prepared to illustrate the courses of study in the school of natural history, and to present a synoptical view of the zoölogy of the state.

Botany.—The herbarium contains nearly all the species of flowering plants indigenous to Illinois, including a complete set of grasses and sedges. The flora of North America is fairly well represented, and a considerable collection of foreign species has been made. A collection of fungi includes a very full set of those most injurious to other plants, causing rusts, smuts, moulds, etc. A collection of wood specimens from two hundred species of North American trees well illustrates the varieties of native wood.

*For a more detailed account of the collections in the different departments, see the appropriate subject under each college.

Plaster casts represent fruits of many of the leading varieties as well as interesting specimens of morphology, showing peculiarities of growth, effects of cross-fertilization, etc.

Geology.—The palæontological collection contains representative fossils from the entire geologic series, but is especially rich in palæozoic forms. It embraces the private collections of Dr. A. H. Worthen, including 650 type specimens: that of Tyler McWhorter, presented by himself: that of Rev. Mr. Hertzer, acquired by purchase: the Ward collection of casts, presented by Hon. Emory Cobb, and a considerable number of special collections representing the fauna and flora of particular groups.

Lithology is represented by type collections of rocks, arranged to illustrate Rosenbusch, from Voigt and Hochgesang, Dr. L. Eger, and A. Kranz: a type collection from Ward: a large number of ornamental building stones: and a stratigraphic collection to illustrate Illinois geology.

The mineralogical collection is especially rich in rock-forming minerals, ores, and materials of economic value. It contains over 7,000 specimens which have been carefully selected to meet the wants of the student.

A series of relief maps of noted localities adds greatly to the facilities for illustration.

Zoölogy.—The zoölogical collections have been specially selected and prepared to illustrate the courses of study in the school of natural history, and to represent a synoptical view of the zoölogy of the state.

The mounted mammals comprise an unusually large and instructive collection of the ruminants of our country, including male and female moose, elk, bison, deer, antelope, etc., and also several quadrumana, large carnivora and fur-bearing animals, numerous rodents, good representative marsupials, cetaceans, edentates, and monotremes. Fifty species of this class are represented by eighty specimens. All the orders, excepting the Proboscidea, are represented by mounted skeletons. There is also a series of dissections in alcohol, illustrating the comparative anatomy of the group.

The collection of mounted birds includes representatives of all the orders and families of North America, together with a number of characteristic tropical, Bornean, and New Zealand forms. The collection is practically complete for Illinois species. Many of the specimens are excellent examples of artistic

taxidermy. There is also a fine collection of the nests and eggs of Illinois birds. A series ot several hundred unmounted skins is available for the practical study of species, and the internal anatomy is shown in alcoholic dissections, and mounted skeletons of all the orders.

The cold-blooded Vertebrates are represented by a series of mounted skins of the larger species, both terrestrial and marine: mounted skeletons of typical representatives of the principal groups; alcoholic specimens, both entire and dissected; and casts. The alcoholics include series of the reptiles, amphibians, and fishes, the latter comprising about three hundred species. The dissections illustrate the internal anatomy of the principal groups. The casts represent about sixty species, nearly all fishes.

The Mollusca are illustrated by alcoholic specimens of all classes and orders, and dissections showing the internal anatomy of typical forms. There are several thousand shells belonging to seventeen hundred species. The collection of Illinois shells is fair but incomplete.

Of the Arthropoda the entomological cabinet contains about three thousand species (principally American), named, labeled, and systematically arranged. There is also a series of Crustacea, some dried but mostly in alcohol, the latter including a number of dissections.

The lower invertebrates are represented by several hundred dried specimens and alcoholics, and by a large series of the famous Blaschka glass models.

The embryology of vetebrates and invertebrates is illustrated by a set of Ziegler wax models, and several series of slides, sections, and other preparations.

In addition to the above the extensive collections of the State Laboratory of Natural History are available for illustrative purposes, as well as for original investigation by advanced students.

MUSEUM OF INDUSTRIAL ARTS.

A large room is devoted to a museum of practical art, the materials for which are constantly accumulating in the various scientific departments. Prominent among the agricultural specimens here exhibited is an excellent collection of the subspecies and varieties of Indian corn, including the best of their

kinds: a considerable collection of small grains and of grasses: a collection of fibres in various states of manufacture, and a series of analyses of grains, showing at a glance the elements and proportion of structure. The museum contains full lines of illustrations of the work of the shops: models made at the University or purchased abroad: drawings in all departments: Patent Office models, etc.: samples of building materials, natural and artificial: a large collection illustrating the forestry of Illinois, Florida, and California: with whatever may be secured that will teach or illustrate in this most important phase of university work. The exhibit made by the University at the Centennial and at the Cotton Exposition at New Orleans, finds a permanent abode in this apartment, and very large additions have been made of materials received from the Columbian Exposition of 1893.

A notable feature of this collection is the gift of Henry Lord Gay, architect, of Chicago. It consists of a model in plaster and a complete set of drawings of a competitive design for a monument to be erected in Rome, commemorative of Victor Emanuel, first king of Italy. The monument was to be of white marble, an elaborate Gothic structure, beautifully ornamented, and 300 feet high. Its estimated cost was to have been seven and a quarter millions of francs. The design was placed by the art committee second on a list of 289 competitors. Mr. Gay's generous gift occupies the place of honor in the museum of industrial arts.

COLLEGE OF LITERATURE AND ARTS.

FACULTY.

ANDREW S. DRAPER, LL.D., PRESIDENT.
DAVID KINLEY, PH.D., DEAN, Economics and Sociology.
THOMAS J. BURRILL, PH.D., LL.D., Botany.
SAMUEL W. SHATTUCK, C.E., Mathematics.
EDWARD SNYDER, A.M., German.
CHARLES W. ROLFE, M.S., Geology.
ARTHUR W. PALMER, SC.D., Chemistry.
FRANK F. FREDERICK, Art and Design.
HERBERT J. BARTON, A.M., Latin.
CHARLES M. MOSS, PH.D., Greek.
DANIEL K. DODGE, PH.D., English.
DANIEL W. SHEA, PH.D., Physics.
JAMES G. BRUNER, PH.D., Romance Languages.
DANIEL H. BRUSH, CAPTAIN 17TH INFANTRY, U.S.A., Military Science.
WILLIAM J. ECKOFF, PD.D., PH.D., Pedagogy.
GEORGE W. MYERS, M.L., Mathematics (on leave).
KATHARINE MERRILL, A.B., English.
WILLIAM O. KROHN, PH.D., Psychology.
MRS. ELIZABETH C. BRUNER, A.B., German.
HENRY E. SUMMERS, B.S, Physiology.
EDGAR J TOWNSEND, PH.M., Mathematics.
EVARTS B. GREENE, PH D., History.
ANITA M. KELLOGG, B.E., Elocution.
ARTHUR H. DANIELS, PH.D., SECRETARY, Philosophy.
HARRY S. GRINDLEY, SC.D., Chemistry.
T. ARKLE CLARK, B.L., Rhetoric.
ALICE M. BARBER, M.S., Botany.
HERMAN S PIATT, A.M., French.
FRANK SMITH, A.M., Zoölogy.
RALPH P. SMITH, PH.B., German.
HELEN E. BUTTERFIELD, M.L., Rhetoric.
JEREMIAH G. MOSIER, B.S., Geology.
HARLEY E. REEVES, Military.

AIMS AND SCOPE.

The College of Literature and Arts includes those branches usually comprised in a department of philosophy and arts, with the exception of the natural sciences. The aim of the college is a double one: to furnish a liberal education, and to afford the largest opportunity for specialization in literary and philosophical subjects. It is believed that this double purpose can be best accomplished by a judicious combination of disciplinary and information studies, which, while so directing the work of the student as to secure the desired mental training, shall also allow him large liberty of choice both in his main lines of work and in subjects auxiliary thereto.

In accordance with this general plan, a minimum of prescribed work is laid out for the first two years of the course. The whole of the work for the first year, and part of that of the second, is prescribed. The work for the rest of the course is elective. Within the limits of the prescribed work, moreover, there is permitted to the student a choice of lines of work. He may choose a classical course, in which case he is required to take Greek and Latin for the first two years. He may, on the other hand, choose a modern language or a general philosophical course. In these cases he may take any one of the four foreign languages listed among the requirements, and any science open to him.

In the choice of his electives other than his major work the student may take a minimum of work in a maximum number of subjects, or he may take a maximum amount of work in the minimum number of subjects necessary to fill up his time according to the rules of the University.

The elective courses open to the students of the College include subjects from the Colleges of Agriculture, Science, and Engineering. The sciences are not an integral part of the work of this College; but the training derived from their study is so important a part of a liberal education that every student of the College is earnestly advised to extend his study of the sciences so far as may be.

Many of the subjects offered naturally fall into groups: as, for example, the Ancient Languages and Literature; Modern Languages and Literature, the Philosophical studies, including Psychology, Logic, Philosophy, Ethics, Pedagogy, and History and the group of political sciences. In accordance with this

grouping the courses open to the student may be classified as follows: The Classical course: the Latin course: the English and Modern Language course: and the Philosophical course. In making out his list of studies the student should specify in which one of these groups of studies he wishes to do his principal work. He is advised to choose his courses with a view to his special needs, determining first his principal subject and choosing as his other electives, in the main, subjects auxiliary to it.

REQUIREMENTS FOR GRADUATION.

Forty full term-credits, including Military, together with an acceptable thesis, are required for graduation. Every student must take the prescribed subjects: in addition he must select at least two subjects from list A as his major electives, in each of which he must make not less than six full term-credits. He must then choose from lists A and B work which will give him the remainder of his necessary credits.

No credits will be granted in any subject in either list except according to the enumeration given. For example, if work may be taken in a subject for from three to six credits, no credit will be allowed for less than three terms' work.

The thesis required for graduation must be on a subject directly connected with a study in which the student shall have completed at least one full year's work previous to the beginning of the winter term of his senior year, and which is listed among the major subjects in the College of Literature and Arts. On certain conditions the thesis may, by vote of the Faculty of the College, count as one of the forty credits required for graduation.

The only degree given in this College is that of A.B.

CLASSIFICATION OF STUDIES PRESCRIBED.

English, $1\frac{1}{2}$ credits; French, German, Greek, or Latin, 3 credits: History, $1\frac{1}{2}$ credits; Logic, 1 credit; Mathematics, 3 credits: Military, 2 credits; Rhetoric, 2 credits; Natural Science, 3 credits.

The three credits required in science may be obtained by taking a single subject through the year, or by combining single term minors.

ELECTIVE.

List A (Major Courses).

Economics (1 to 8: 100). 6 to 14 credits.
English (2 to 14). 6 to 19⅕ credits.
French (1 to 4). 6 to 12 credits.
German (1 to 4). 6 to 12 credits.
Greek (1 to 9). 6 to 9 credits.
History (2 to 8). 6 to 9 credits.
Latin (1 to 10). 6 to 9⅗ credits.
Mathematics (1 to 18). 6 to 16 credits.
Pedagogy (1 to 7). 6 to 9⅘ credits.
Philosophy (1 to 7). 6 credits.
Psychology (1 to 9). 6 to 8 credits.

List B.

Anthropology, 1 credit.
Art and Design (1, 6). 3 to 6 credits.
Astronomy (4), 1 credit.
Biology, General. (1, 2). 1 to 2 credits.
Botany (6: 1 to 4). 1 to 6 credits.
Chemistry (1, 2, 3a, 3b, 4, 5, 7, 9, 10, 12, 20). 1 to 11 credits.
Economics (1 to 8). 2 to 11 credits.
English (2 to 14), ⅗ to 19⅕ credits.
French (1 to 4). 3 to 11 credits.
Geology (4: 1). 1 or 3 credits.
German (1 to 4: 6). 3 to 11 credits.
Greek (1 to 9). 3 to 9 credits.
Italian (1). 3 credits.
Latin (1 to 10). 3 to 9⅗ credits.
Mathematics (5 to 18). 1 to 11 credits.
Meteorology (1). ⅗ credit.
Mineralogy (1, 2). 3 credits.
Music (1, 2) 2 credits.
Oral Rhetoric (1 to 3: 4, 5). ⅗ to 7⅕ credits.
Pedagogy (1 to 7). ⅗ to 9⅘ credits.
Philosophy (1 to 7). 1 to 6 credits.
Physiology (4: 1, 2). 1, 2, or 5 credits.
Physics (2: 1, 3 to 7). 1 to 11 credits.
Psychology (1 to 9). 1 to 9 credits.
Rhetoric (3, 4). 1 to 4 credits.
Spanish (1). 3 credits.
Zoölogy (1 to 6). 2 to 11 credits.

COURSES OF INSTRUCTION BY YEARS AND TERMS.

The following statement gives the terms in which the subjects are taught and the year in which they may be taken. The numerals refer to the courses marked by the same numerals in the alphabetical statement of courses of instruction. The prescribed subjects are printed in italics. Students in the classical course must take Greek and Latin.

FIRST YEAR.

1. Advanced Algebra (Math. 1, 2): *French* 1, 5*, *German* 1, 5*. *Greek* 1, or *Latin* 1; *Geometry, Solid* (Math. 19); *Military* 1, 2: *Natural Science:* Chemistry 1; Physical Culture 1; *Rhetoric* 1.

2. *French* 1, 5*, *German* 1, 5*, *Greek* 2, or *Latin* 2: Hygiene (Physical Culture 2): *Military* 1, 2: *Natural Science:* Biology 1. Chemistry 2, 3a, Geology 4. Physics 2, or Zoölogy 1, 2, 3: Physical Culture 1: *Rhetoric* 1: *Trigonometry* (Math. 3, 4).

3. *Analytical Geometry* (Math. 6) or *Conic Sections* (Math. 5): French 1, 5*, German, 1, 5*, Greek 3, or Latin 3; Hygiene (Physical Culture 2): *Military* 2; *Natural Science:* Astronomy 4, Biology 2, Botany 6, Chemistry 2, 3b, 4, 20, or Zoölogy 1, 2: Physical Culture 1: *Rhetoric* 1.

*Students in the College of Literature and Arts are permitted to take the scientific French and German if they are pursuing major work in Economics, Mathematics, Pedagogy, Philosophy, or Psychology.

SECOND YEAR.

1. Advanced Algebra (Math. 1, 2): Art and Design 1, 6: Botany 1, 2; Chemistry 1, 5a: Differential Calculus (Math. 7): Economics 1: *English* 1; 2, 5, 6, 8; French 5: 1, 2: German 5; 1, 2: Greek 4: *History* 1, 2; History of Music (Mus. 1): Italian 1: Latin 4; *Military* 2: Mineralogy 1: Oral Rhetoric and Oratory 1, 5: Pedagogy 1, 2, 5: Physical Culture 1: Physics 1, 3: Physiology 4: Psychology 2, 4; Rhetoric 3: Zoölogy 1, 3, 5.

2. Analytical Geometry, Advanced (Math. 8): Art and Design 1, 6: Biology, General, 1; Botany 1, 3: Chemistry 2, 3a, 5b. 9, 12: Economics 1: English 1, 2, 5, 6, 8: French 5: 1, 2: Geology 1, 4; German 5: 1, 2; Greek 5: *History* 1, 2: History of Music (Mus. 1); Hygiene (Phys. Cult. 2); Italian 1: Latin 5; *Military* 2: Mineralogy 2; Oral Rhetoric and Oratory 1, 5: Pedagogy 1, 2, 5:

Physical Culture 1: Physics 2, 1, 3; Physiology 1; Psychology 2, 9: Rhetoric 3, 4: Zoölogy 1, 2, 3, 4, 5, 6.

3. Analytical Geometry (Math. 6) or Conic Sections (Math. 5): Art and Design 1, 6: Astronomy 4: Biology, General, 2; Botany 1, 4, 6; Chemistry 2, 3b, 4, 5c, 9, 12, 20: Economics 2, 5, 7; *English* 1, 2, 5, 6, 8: French 5: 1, 2: Geology 1: German 5: 1, 2, 6: Greek 6: *History* 1, 2: Hygiene (Phys. Cult. 2): Integral Calculus (Math. 9): Italian 1: Latin 6: *Logic* (Philos. 8): *Military* 2, 3: Musical Theory (Mus. 2): Oral Rhetoric and Oratory 1, 5; Mineralogy 2: Pedagogy 3; Physical Culture 1; Physics 1, 3; Physiology 1: Psychology 1, 5: Rhetoric 3; Zoölogy 1, 2, 5, 6.

THIRD YEAR.

1. Advanced Algebra (Math. 1, 2): Art and Design 1, 6: Botany 1, 2; Chemistry 1, 5a, 7, 10: Differential Calculus (Math. 7): Economics 1, 3, 6, 8: English 2, 3, 4, 5, 6, 8, 9: French 5: 1, 2, 3: Geology 1: German 5: 1, 2, 3: Greek 7: History 2, 3, 4, 5: History of Music (Mus. 1): Italian 1: Latin 7, 10: Meteorology 1: Military 3: Mineralogy 1: Oral Rhetoric and Oratory 1, 2, 4, 5: Pedagogy 1, 2, 4, 5, 6: Philosophy 1: Physiology 4: Physical Culture 1: Physics 1, 3, 4, 5, 6: Psychology 2, 4, 7: Rhetoric 3: Theory of Equations (Math. 10): Zoölogy 1, 3, 5.

2. Analytical Geometry, Advanced (Math. 8): Art and Design 1, 6: Biology, General, 1: Botany 1, 3, 5: Chemistry 2, 3a, 5b, 7, 9, 12: Determinants (Math. 11): Economics 1, 3, 6, 8: English 3, 4, 6, 8, 9: French 5: 1, 2, 3: Geology 1, 4: German 5: 1, 2, 3, 6: Greek 8: History 2, 3, 4, 6: History of Music (Mus. 1): Hygiene (Phys. Cult. 2): Italian 1: Latin 8: Military 3: Mineralogy 2: Oral Rhetoric and Oratory 1, 2: Pedagogy 1, 2, 5, 7: Philosophy 2, 4: Physics 2; 1, 3, 4, 5, 6: Physiology 1: Physical Culture 1: Psychology 2, 3, 6, 7, 9: Rhetoric 3, 4: Zoölogy 1, 2, 3, 4, 5, 6.

3. Art and Design 1, 6: Astronomy 4: Biology, General, 2: Botany 1, 4, 5, 6: Chemistry 2, 3b, 4, 5c, 7, 9, 12, 20: Economics 2, 4, 5, 7, 8: English 2, 3, 4, 6, 8, 9: French 5: 1, 2, 3: Geology 1; German 5: 1, 2, 3, 6: Greek 9: History 2, 3, 4, 7: Hygiene (Phys. Cult. 2): Intregal Calculus (Math. 9): Invariants (Math. 12): Italian 1: Latin 9, 10: Military 3; Mineralogy 2: Musical Theory (Mus. 2): Oral Rhetoric and Oratory 1, 2, 4, 5: Pedagogy 3, 7: Philosophy 3, 6, 7; Physical Culture 1: Physics 1, 3, 5, 6: Physiology 1: Psychology 1, 5, 7: Rhetoric 3: Zoölogy 1, 2, 5, 6.

FOURTH YEAR.

1. Art and Design 1, 6: Botany 1, 2: Chemistry 1, 5a, 7, 10: Economics 1, 3, 6, 8, 100: English 2-14: French 5: 1, 2, 3, 4: Geology 1: German 5: 1, 2, 3, 4: History 2, 3, 4, 5, 8: History of Music (Mus. 1): Italian 1: Military 3: Mineralogy 1: Oral Rhetoric and Oratory 1, 2, 4, 5: Pedagogy 1, 2, 4, 5, 6: Philosophy 1, 5: Physical Culture 1: Physics 1, 3, 4, 5, 6, 7: Physiology 4: 2: Psychology 2, 4, 7, 8: Rhetoric 3: Spanish 1: Theory of Equations (Math. 10): Zoölogy 1, 3, 5.

2. Art and Design 1, 6: Biology, General, 1: Botany 1, 3: Chemistry 2, 3a, 5b, 7, 9, 12: Economics 1, 3, 6, 8: 100: English 2-14: French 5: 1, 2, 3, 4: Geology 4: German 5: 1, 2, 3, 4, 6: History 2, 3, 4, 6, 8: History of Music (Mus. 1): Military 3: Hygiene (Phys. Cult. 2): Mineralogy 2: Oral Rhetoric and Oratory 1, 2, 4, 5: Pedagogy 1, 2, 5, 7: Philosophy 2, 4, 5, 6, 8: Physical Culture 1: Physics 2: 1, 3, 4, 5, 6, 7: Physiology 1, 2: Psychology 2, 3, 6, 7, 8: Rhetoric 3, 4: Spanish 1: Theory of Determinants (Math. 11): Zoölogy 2, 3, 4, 5, 6.

3. Art and Design 1, 6: Astronomy 4: Biology, General, 2: Botany 1, 4, 6: Chemistry 2, 3b, 4, 5c, 7, 9, 12, 20: Economics 2, 4, 5, 7, 8: 100: English 2-14: French 5: 1, 2, 3, 4: German 5: 1, 2, 3, 4, 6: History 2, 3, 4, 7, 8: Hygiene (Phys. Cult. 2): Italian 1: Military 3: Minerology 2: Musical Theory (Mus. 2): Oral Rhetoric and Oratory 1, 2, 4, 5: Pedagogy 1, 3, 7: Philosophy 3, 4, 6, 7: Physical Culture 1: Physics 1, 3, 5, 6, 7: Physiology 1, 2: Psychology 1, 5, 7, 8: Rhetoric 3: Spanish 1: Theory of Invariants (Math. 12): Zoölogy 2, 5, 6.

DESCRIPTION OF DEPARTMENTS.

Art and Design.

This work subserves a twofold purpose. (1) It affords students the opportunity to acquire such a knowledge of free hand drawing as their chosen courses may require. (2) It offers to such as have a talent or taste for art the best facilities for pursuing studies in industrial designing or other branches of fine art.

In all courses the work is made of direct benefit to the students in other lines, and at the same time it aims to develop in them a love and an appreciation of the beautiful.

Special students, not otherwise connected with the University, may enter this department upon payment of moderate fees.

Economics.

The study of economics for undergraduates may extend through three years. The work is so arranged that the student can take a continuous course for either one or more years. The introductory courses are repeated each year and the advanced courses are divided into two groups and given in alternate years. Text books are used in the introductory courses, but only as guides. Every student is required to make frequent short reports on assigned topics and to undertake at least one more elaborate piece of investigative work. The assigned readings are designed to cover as large a field as possible in the literature of the subject, to present all disputed matters from different points of view, and are supplemented by discussions and lectures. Educational development, acquaintance with the subject, and training for good citizenship are ends kept steadily in view.

English Language and Literature.

The courses are designed to give a continuous view of the two-fold subject from the earliest times to our own day. In the junior and senior years double courses are offered, so that students, having had the fundamental work of the sophomore year, may, if desired, confine themselves either to philology or to literature. The aim in the study of literature is to approach the works of an author from the philosophical, emotional, and esthetic, as well as from the merely linguistic and historical, points of view. To further this aim, students are required to report on assigned topics and on additional works not read in class, and also to read as broadly as possible in contemporary authors and in the critical works bearing on the author or period under discussion.

French.

(See Romance Languages, p. 36.)

German.

The primary aim of instruction in the elementary classes is reading, so that the student may avail himself of the aid of for-

eign works relating to his particular department. Much importance, however, is attached to the study of language as a means of general training. A thorough study of the structure of the language is the basis: as much as possible of this is done by practical work, analysis, and composition, rather than by mere memorizing rules.

The more advanced classes take up the study of the classic poets and prose writers. The third year's work consists of critical study of the prominent literary works, of composition, and of the history of the literature in German.

Lectures are given in German and the use of the language in study is demanded.

The fourth year is an elementary course of Gothic and Old German.

The one year course is designed for the technical students with a minimum of grammar and a maximum of reading.

Greek.

The general purposes of the courses laid out in this subject are these: first, to teach the Greek language: second, to cause students to appreciate its literature: and third, to call attention to those numerous, in the history, thinking, and institutions of the Greeks which illustrate similar phenomena noticeable among ourselves. To accomplish the first object, due attention is paid to the principles of grammar, particularly in making the syntax appear as the evidence of orderly mental procedure, and by continual practice in extemporaneous translation. The second is effected by a study of the surroundings and spirit of an author, and of those literary devices which give character to his productions. The third end is reached through familiar talks upon suitable topics as they are met.

In courses 7 and 8 a more mature line of work is contemplated, for which courses 1 to 6 are a graded preparation. Ample library and other appliances are provided. Course 9 is more general, but is expected to articulate, for classical students, with courses 1–8.

History.

The purpose of the instruction in this department is, in the first place, to give the student an elementary knowledge of historical facts, with special emphasis upon mediæval and modern

history, and, more particularly, upon the national history of England and the United States.

The effort is made, secondly, to train students in habits of careful and intelligent reading; to enable them to discriminate between trustworthy and untrustworthy books; and to give them some conception of the sources of historical knowledge, and the methods of historical research, through readings in contemporary writers and elementary investigation in documentary authorities.

Finally, the instruction in this department seeks, upon the basis of this elementary knowledge of facts and books, to cultivate an intelligent taste for historical reading which may be carried farther in subsequent years.

Italian.

(See Romance Languages, p. 36.)

Latin.

The courses at present offered in Latin are ten in number and extend over three years. It is recognized that many students are deficient in preparation and need rigid drill in noun and verb syntax, while there are few to whom this drill is not beneficial. With this thought, the first term's instruction is, as far as needed, grammatical, and prominence is given to Latin writing as the very best method of acquiring a mastery of the language.

Ability to read Latin in the Latin order is strenuously insisted on, as inability in this particular is considered one of the chief reasons for the small results that many students secure.

As soon as this preliminary work is done, the attention is directed to two ends. The first is the acquisition of a constantly increasing power to read the language with ease and pleasure. As large a number as possible of representative authors are read. The thought is constantly emphasized that students are not simply reading Latin: they are reading some of the great literary masterpieces of the world, and should enjoy them as such. The second aim is to introduce the student to the daily life of the Roman: to make his home life vivid, his political life a reality. The contribution of the Roman world to the language, literature, and institutions of our time is so great that an intimate acquaintance with that life is of the highest educational

value. The courses offered include a teachers' seminary. Selections are read from the last six books of Vergil's Aeneid. Discussions and lectures on methods, aims, and results in Latin teaching form a part of the work. At intervals the students take charge of the recitation.

The Latin department is amply supplied with all necessary appliances for the successful prosecution of the work.

Mathematics.

In mathematics is included the entire offering of the University courses in pure mathematics, and in physics and astronomy. The instruction in pure mathematics has for its object to promote habits of mental concentration and continuity of thought, to develop the capacity to form and combine abstract conceptions, and to cultivate deductive reasoning. The course is so arranged as to meet the requirements of those who wish to fit themselves for instructors, and of those who study the science for the love of it.

Parallel with the pure mathematics of the junior and senior years, two lines of associated work in applied mathematics—physical and astronomical—are offered, either of which may be, and one of which must be, taken by the student wishing to make mathematics his leading course. One of these lines leads from the physics of the sophomore year through the mathematical theory of electricity and magnetism, heat, light, and sound; and the other through surveying and mechanics to celestial mechanics and to general and mathematical astronomy.

For fuller information see p. 70.

Music.

The department of music is designed to fill a demand for a practical musical education. The courses offered are intended to give the pupil a thorough foundation for a musical education and to prepare him for entrance into any school devoted exclusively to the more advanced study of music. Great latitude is given in the selection of lines of work, to meet the personal needs and abilities of the student. The time that may be devoted to the subject, especially in the study of a particular instrument, is entirely indefinite, as it depends altogether upon the ability of the student.

Sight reading is considered of great importance, and special stress is laid upon this work in all the courses. The student is encouraged to attend good concerts, of which a number are given every year, and to join one of the musical organizations of the University.

The University Chorus is organized with a view to spreading a musical spirit throughout the University, and is free to all students of the University. It consists of two classes, the first of which is elementary, and the second composed of students selected from the first. The rudiments of music are taught in this work and the student is instructed in the simpler requirements of choral work. The work is popularized by the use of college glees and songs, and made interesting as well as instructive.

The course in the History of Music and lives of the composers consists of lectures with collateral reading; that in Harmony and Counterpoint consists of lectures and practical problems and exercises for the student, the object being to give a thorough understanding of the fundamental principles. These courses, but not the practical work in music, may be taken for credits in the College of Literature.

For the special fees charged see under *Expenses*.

Pedagogy.

Pedagogy is not only a professional, it is a culture study. We cannot escape educating ourselves. The question is only whether we shall educate ourselves well or ill. In the list offered this year, accordingly, neither logical nor moral training nor the philosophical foundations of pedagogy have been omitted and the point of view taken throughout is the highest known in the pedagogical field—the Herbartian. The course is broadened to meet the needs not only of intending teachers but of all University students.

Philosophy.

The work in this department includes History of Philosophy, Metaphysics, Ethics, and Logic, and is so arranged that the student can take a continuous course for either one or two years.

The courses are planned to meet the needs of those who make philosophy their specialty, and also of those who desire

an acquaintance with the subjects as a means of general culture. It is the constant aim to emphasize the meaning and interest of philosophy and the relations of its problems to the life of man. The subjects are taught by lectures, recitations, and the seminary method.

Psychology.

The aim of this department is to acquaint the student with the nature of mind, its modes of behavior, the forms under which it manifests itself, and the laws according to which it unfolds and develops. Not only is the normal mind made the subject of thorough study, but also mind in its abnormal phases. The elements of mentality as exhibited in the various animals and in early infant life are investigated with a view to discover the components of adult mental life. The mental make up of the defective and criminal classes is also inquired into in order that light may be thrown upon the social questions as to the best methods to be employed in the treatment of these classes, the best education for the defective, and the best environment for the criminal.

Special attention is given to scientific methods of child study because of the direct and important relations in which the results of such study stand to the various pedagogical theories and the estimate of the educational value of the different subjects taught in our common schools.

Rhetoric.

The courses at present offered in rhetoric are four, and extend over two years and one term. The object of the courses is not only to acquaint the student with the principles of rhetoric, but to teach him correctness and effectiveness in the use of English. A text book is used supplemented with lectures and critical discussion of work done. From twenty to thirty short themes and two long papers a term are required from each student. More emphasis is put upon practice than upon theory.

The second year's work is a daily theme course and is intended to give practice in higher English composition and criticism.

Oral rhetoric.

The main purpose of this department is to teach command of spoken English, and to cultivate rational and effective methods

of expression by voice and action. Practical exercises are given for the development of strength, flexibility and compass of voice, healthful and expressive carriage of the body, and ease and grace of movement.

Oral Rhetoric, or more properly speaking, the Rhetoric of Oral Expression, relates to style in speaking and aims to teach the intelligent use of voice and gesture in the conveyance of thought to others.

The work in Oratory is an advance upon Oral Rhetoric, leading the student to a knowledge and appreciation of the power of public speech, to acquaintance with the most famous orations, and offering him an opportunity to develop his own ability in this direction.

The art of conversation, extemporaneous speech, and oral composition are studied, and lectures on the essentials of public address and the philosophy of expression are given. The student is required to present original work for criticism as to composition and delivery. Practical drill is given in melody of speech, emphasis, rhythm, inflection, tone projection, and tone color.

To give additional opportunity for the training of individual talent in the higher culture of the art of speech, an elective course in Expression is offered. The course includes rendering, impersonation, dialect reading, character sketches, monologues, modern plays, analysis of Shakespeare, and dramatic action.

An optional course in reading is offered to students from all the colleges. This is practical work in interpreting prose or verse by reading aloud from standard literature, manuscript, periodicals, and magazines.

The Romance Languages and Literature.

The Romance Language department offers four years of instruction in French, and one year each in Italian and Spanish. In French 1, in Italian, and in Spanish, careful attention is given to pronunciation and to the reading of modern novels and comedies. In French 2, the outlines of the literature of the seventeenth, eighteenth, and nineteenth centuries are studied, while French 3 makes a special study of the origin and development of the drama in France. In each class the literature is studied at first hand, the student being required to read the principal masterpieces and to report on them before the class. The in-

structor endeavors to create an interest in, and an appreciation for, the best works of French literature. In French 4, intended primarily for graduate students, but open to those who have had French 3 or its equivalent, the attention of the student is directed to the origins of the language, and he is taught the use of scientific methods of original investigation in language and literature. At the Romance Language Club the instructor in charge calls attention to the latest books, articles, reviews, etc., on subjects connected with the Romance languages. The most important Romance articles contained in the contemporary reviews and magazines are reviewed by the students before the club.

Sociology.

(See Economics, p. 30.)

Spanish.

(See Romance Languages, p. 36.)

COLLEGE OF ENGINEERING.

FACULTY.

ANDREW S. DRAPER, LL.D., PRESIDENT.
N. CLIFFORD RICKER, M.ARCH., DEAN, Architecture.
THOMAS J. BURRILL, PH.D., Botany.
SAMUEL W. SHATTUCK, C.E., Mathematics.
IRA O. BAKER, C.E., Civil Engineering.
CHARLES W. ROLFE, M.S., Geology.
ARTHUR N. TALBOT, C.E., Municipal and Sanitary Engineering: Mechanics.
ARTHUR W. PALMER, SC.D., Chemistry.
FRANK F. FREDERICK, Art and Design.
SAMUEL W. PARR, M.S., Applied Chemistry.
LESTER P. BRECKENRIDGE, PH.B., Mechanical Engineering.
DANIEL W. SHEA, PH.D., Physics; Electrical Engineering.
DANIEL H. BRUSH, Captain U.S.A., Military Science.
GEORGE W. MYERS, A.M., Mathematics. [On leave.]
KATHARINE MERRILL, A.B., English.
JAMES M. WHITE, B.S., Architecture.
EDGAR J TOWNSEND, PH.M., Mathematics.
WILLIAM H. VAN DERVOORT, M.E., Mechanical Engineering.
WILLIAM D. PENCE, B.S., SECRETARY, Civil Engineering.
GEORGE W. PARKER, Architectural Shops.
T. ARKLE CLARK, B.L., Rhetoric.
CYRUS D. MCLANE, B.S., Architecture; Mechanics.
CYRIL B. CLARK, Machine Shops.
HERMAN S PIATT, A.M., French.
HERVEY E. PARKER, Architectural Shops.
JAMES D. PHILLIPS, B.S., General Engineering Drawing.
CHARLES A. GUNN, B.S., Architecture.
WILLIAM ESTY, B.S., A.M., Electrical Engineering.
BERNARD V. SWENSON, B.S., Electrical Engineering.
ALBERT R. CURTISS, Mechanical Wood Shops and Foundry.
LORIN W. PEABODY, B.S., Laboratory of Applied Mechanics.
HENRY JONES, Forge Shops.
HARLEY E. REEVES, Military Science.

Ralph P. Smith, Ph.B., German.
Peter Mogensen, B.S., Mathematics.
Helen E. Butterfield, M.L., Rhetoric.
Robert C. Vial, B.S., General Engineering Drawing.
Alton C. Burnham, B.S., Mechanical Engineering.
Fred A. Sager, B.S., Physics.
Edward J. Lake, Art and Design.
Luther D. Brode, Assistant in Foundry.

AIMS AND SCOPE.

The purpose of the College of Engineering is thoroughly to educate and prepare engineers and architects for their future professional courses. Its aim must therefore be twofold—general and technical. A considerable proportion of the course of study must be devoted to general and literary work, since a graduate is expected now to arrange his ideas in clear order, and to write or speak effectively, whenever it becomes necessary. Professional success frequently depends upon this power far more than is commonly supposed.

Moreover there is an ever-increasing fund of general and scientific knowledge with which every educated man is expected to be conversant, if he desires to retain the esteem of his associates and clients. Much of the most valuable material is yet locked up in foreign languages, and their keys must be acquired by patient study and practice. Scarcely a single science is not at some time useful to the professional man, and some of them, like mathematics or physics, are so intimately interwoven with the different branches of technical knowledge, as to be practically indispensable, and so require a more thorough mastery than is necessary to the literary man. It might appear that this general training would alone be sufficient to absorb the entire attention of the student during his whole course, but not less than one-half his time must be given to purely technical training, and the acquiring of a professional capital or stock of information and knowledge of details, which is almost limitless in its demands and possibilities.

The methods employed for embodying new ideas in drawings, intelligible to other professional men and to mechanics, must likewise be acquired.

A knowledge of the latest results of scientific experiments is likewise essential, requiring wide reading by some one, either student or professor. Engineering knowledge must be fresh to

be valuable, since ideas and methods are quickly supplanted by improved ones, and become useless except as mile-stones of progress. Consequently the most valuable part of this professional knowledge can never be crystallized in text books, but must be drawn from the mental stores of the teacher.

GENERAL METHODS OF INSTRUCTION.

Whenever suitable text books can be found they are employed, because saving much time in acquiring facts and data, and because such books become doubly valuable for later reference when enriched by notes and additions. But to arouse and awaken the enthusiasm of the student, occasional or stated lectures are necessary, and these are fully illustrated by sketches, diagrams, drawings, and photographs of executed work. They are frequently used in the advanced classes, partly because the deficiency of text books is there most apparent. Additional courses of extended reading are marked out by references to the University library, so that each student may enjoy the greatest possible benefit from the course of instruction. In all courses of study offered by the College, drawing in its manifold forms and uses is made of especial importance both in its application and its modes of execution.

COMPUTING APPARATUS.

A collection of machines and apparatus for abbreviating computations, and especially for use in the calculation of tables, includes the following instruments:

A Thomas's 10-place arithmometer, giving products of numbers to 20 places. This is the largest size manufactured and was imported especially for the University. It is probably as convenient and accurate as any computing machine yet invented. It performs addition, subtraction, multiplication, and division, and is particularly useful in calculating or verifying numerical tables. Two Thacher's computing scales, for performing multiplication, division, squaring, and extraction of square root. This instrument is sufficiently accurate for almost all purposes, and can be used more rapidly than the former. An Amsler's polar planimeter for measuring the area of figures of any form, and

principally employed in graphic statics, or by the mechanical engineers for measuring indicator diagrams.

A Coradi's rolling planimeter of largest size, and a Coradi's polar planimeter, for the same purposes, but much more accurate in use. An Amsler's integrator for obtaining area, static moment, and moment of inertia of plane figures, especially of sections of columns, beams, etc. A Coradi's pantagraph of best construction for reduction of drawings and maps. Boucher's calculator, Ram's slide rules, duplex slide rule, Webb's adders, etc.

DESCRIPTION OF DEPARTMENTS.

Architecture.

The department of architecture and architectural engineering occupies nearly the entire upper story of Engineering Hall, thereby securing drawing rooms lighted by skylights and ample in space.

Course of Instruction.—The course of study in architecture prepares graduates for professional work as architects, draughtsmen, and superintendents of construction. The scientific principles of construction and its practical details, drawing applied to all purposes, the principles of design and their application to the planning and designing of buildings, are therefore made especially prominent in the course of instruction. Great attention is also devoted to the history and esthetics of architecture.

Instruction is imparted by text books, when suitable works exist, the solution of numerous problems, blue-print lecture notes and syllabuses, and by constant practice in original design, whenever this can be employed. The collection of plates in the architectural cabinet, with models and sketches, are used as illustrations and suggestions.

Drawing and designing are practised throughout the entire course, and two years' instruction is provided in free hand drawing, modeling, water colors, industrial design, and sketching from nature.

Shop practice comprises a series of pieces in joinery, cabinet-making, turning, etc., and models of structures from drawings.

Apparatus.—A large collection of casts from Spain and from Berlin are jointly used by the departments of architecture and

of art; models of ceilings, roof trusses, stairs, joints in woodwork, with a large number of specimens of stone, terra cotta, moulded bricks, etc., are arranged in the architectural museum; also an interesting collection of Norwegian, Indian, and Japanese art works. A series of drawings of buildings designed by noted architects is placed in the architectural cabinet for convenient reference and use.

A fine collection of engravings, photographs, and photoprints is mounted on about 15,000 cards 11x14 inches, and is placed in the drawing rooms, classified according to the decimal system, for use in construction, history of architecture, and designing, always open for free use, and forming a most valuable working library.

An electric-arc lantern of latest and best type is permanently placed in a special lecture room with stepped floor, and 1,200 lantern slides illustrate the history of architecture, and especially Richardson's best work and American houses.

A good number of the latest and best American, English, French, and German architectural works is to be found in the library.

Apparatus for surveying, for tests in heating and ventilation, for photography and making lantern slides, is provided, with an equipment for seminary and graduate work.

The architectural shops are well supplied with the necessary machines, benches, and sets of fine tools for shop practice.

Each student in a drawing room is furnished with an adjustable drawing table of most convenient form, a locker and two boards, with a drawer for drawings and paper, available for his use during the entire day.

Course in Architecture.

Required for Degree of B. S. in Architecture.

FIRST YEAR.

1. Advanced Algebra (Math. 2); Elements of Drafting and Sketching (Drawing, Gen. Eng'g 1, 4.); Shop Practice (Arch. 1); French 5 or German 5 or English 1, 2; Military 1, 2.

2. Trigonometry (Math. 4); Descriptive Geometry (Draw'g, Gen. Eng'g 2); Shop Practice (Arch. 1); French 5, German 5, or English 1, 2; Military 1, 2.

3. Analytical Geometry (Math. 6); Descriptive Geometry and Lettering (Drawing, Gen. Eng'g, 2, 3); Shop Practice, (Arch. 1); French 5, German 5, or English 1, 2; Military 2.

SECOND YEAR.

1. Applied Mechanics (Theo. and Applied Mech. 4); Wood Construction (Arch. 2); Physics 1, 3; Rhetoric 2; Military 2.

2. Strength of Materials (Theo. and Appl'd. Mech. 5); Stone, Brick, and Metal Construction (Arch. 3); Physics 1, 3; Rhetoric 2; Military 2.

3. Roofs (Arch. 5); Sanitary Construction (Arch. 4); Physics 1, 3; Rhetoric 2; Military 2.

THIRD YEAR.

1. History of Architecture (Arch. 6); Architectural Drawing (Arch. 9); Free Hand Drawing, or Modeling (Arch. 20 or 21); Architectural Seminary (Arch. 11).

2. History of Architecture (Arch. 6); Architectural Drawing (Arch. 8); Free Hand Drawing, or Water Color (Arch. 20 or 21); Architectural Seminary (Arch. 11).

3. History of Architecture (Arch. 7); Architectural Drawing (Arch. 10); Free Hand Drawing, or Sketching (Arch. 20 or 21); Architectural Seminary (Arch. 11).

FOURTH YEAR.

1. Superintendence, Estimates, and Specifications (Arch. 12); Heating and Ventilation (Arch. 13); Chemistry 1; Thesis.

2. Architectural Perspective (Arch. 14); Architectural Designing (Arch. 16); Requirements and Planning of Buildings (Arch. 15); Thesis.

3. Esthetics of Architecture (Arch. 18); Architectural Designing (Arch. 17); Thesis.

Architectural Engineering.

This course of study prepares graduates for professional employment as architects, structural designers, and computers, as well as superintendents of construction. It is intended for students preferring the structural and mathematical side of the profession to its artistic side, who desire to pursue the full engineering course in mathematics, and to acquire a thorough knowledge of iron and steel construction as it is now employed in buildings. It differs principally from the architectural course

by the addition of a second year of mathematics, and by the substitution of a year of civil engineering study in masonry design, bridge analysis and design for the year of free hand drawing.

Course in Architectural Engineering.

Required for Degree of B.S. in Architectural Engineering.

FIRST YEAR.

1. Advanced Algebra (Math. 2); Elements of Drafting and Sketching (Drawing, Gen. Eng'g, 1 and 4); Shop Practice, (Arch. 1); French 5, or German 5, or English 1 and 2; Military 1 and 2.

2. Trigonometry (Math. 4); Descriptive Geometry (Drawing, Gen. Eng'g, 2); Shop Practice (Arch. 1); French 5, or German 5, or English 1 and 2; Military 1 and 2.

3. Analytical Geometry (Math. 6); Descriptive Geometry and Lettering (Drawing, Gen. Eng'g, 2 and 3); Shop Practice (Arch. 1); French 5, German 5, English 1, 2; Military 2.

SECOND YEAR.

1. Differential Calculus (Math. 7); Wood Construction (Arch. 2); Physics 1 and 3; Rhetoric 2; Military 2.

2. Advanced Analytical Geometry (Math. 8); Stone, Brick, and Metal Construction (Arch. 3); Physics 1 and 3; Rhetoric 2; Military 2.

3. Integral Calculus (Math. 9); Sanitary Construction (Arch. 4); Physics 1 and 3; Rhetoric 2; Military 2.

THIRD YEAR.

1. Analytical Mechanics (Theo. and Appl'd Mech. 1); History of Architecture (Arch. 6); Chemistry 1; Architectural Seminary (Arch. 11).

2. Resistance of Materials (Theo. and Appl'd Mech. 2); History of Architecture (Arch. 6); Architectural Drawing (Arch. 9); Architectural Seminary (Arch. 11).

3. Hydraulics (Theo. and Appl'd Mech. 3); Roofs (Arch. 5); Architectural Drawing (Arch. 10); Architectural Seminary (Arch. 11).

FOURTH YEAR.

1. Masonry Construction (Civil Eng'g 5); Superintendence, Estimates, and Specifications (Arch. 12); Heating and Ventilation (Arch. 13); Thesis.

2. Bridge Analysis (Civil Eng'g 8); Architectural Perspective (Arch. 14); or Advanced Graphics (Arch. 19); Architectural Designing (Arch. 16); Thesis.

3. Bridge Design (Civil Eng'g 8); Surveying (Civil Eng'g 10); Architectural Designing (Arch. 17); Thesis.

Civil Engineering.

The design is to furnish a course of theoretical instruction, accompanied and illustrated by a large amount of practice, which will enable the student to enter intelligently upon the various and important duties of the civil engineer.

Instruction.—While the instruction aims to be practical by giving the student information and practice directly applicable in his future professional work, the prime object is the development of the mental faculties. The power to acquire information and the ability to use it, is held to be of far greater value than any amount of so-called practical acquirements. The method of instruction consists in coupling the development of intellectual power with the acquisition of information directly useful to the civil engineer in his profession.

The instruction is given by lectures, text books, and reading, to which are added numerous problems and practical exercises, such as will best serve to explain principles completely and fix them in the mind. Models and instruments are continually used, both in lectures and by the students.

Equipment.—This department has an extensive equipment of compasses, railroad transits, solar transits, levels, plane tables, barometers, etc. A small observatory is provided with the instruments necessary in determining latitude, time, and azimuth. The equipment includes an astronomical transit, a 10-inch alt-azimuth reading to seconds, three chronometers, two sextants, and five isolated masonry piers. For the lecture room, the department is provided with full size joints of an actual railroad bridge, sections of columns, eye-bars, etc., and a very large collection of lithographs, photographs, and blue prints of bridges and buildings.

Course of Study.—The complete course occupies four years. The several subjects included therein are shown in the list below. Each study requires five recitations a week, and should receive daily from three to four hours of the student's time. Some of the class exercises occupy one hour daily, while others require two hours. As a rule the latter require less time for preparation. The order of studies as given by the year and term in the tabular view of the course, should be closely followed to avoid interference in hours of recitation, and because the studies are there arranged in the order which best meets the preparation of the student.

Course in Civil Engineering.

Required for the Degree of B.S. in Civil Engineering.

FIRST YEAR.

1. Advanced Algebra (Math. 2); Elements of Drafting and Sketching (Drawing, Gen. Eng'g, 1 and 4): Shop Practice (Mech. Eng'g 1): French 5, or German 5, or English 1 and 2: Military 1 and 2.

2. Trigonometry (Math. 4); Descriptive Geometry (Drawing, Gen. Eng'g, 2); Shop Practice (Mech. Eng'g 1); French 5, or German 5, or English 1, 2; Military 1 and 2.

3. Analytical Geometry (Math. 6); Descriptive Geometry and Lettering (Drawing, Gen. Eng'g, 2 and 3): Shop Practice (Mech. Eng'g 1); French 5, or German 5, or English 1, 2; Military, 2.

SECOND YEAR.

1. Differential Calculus (Math. 7): Land Surveying (Civil Eng'g 1); Physics 1 and 3; Rhetoric 2; Military 2.

2. Advanced Analytical Geometry (Math. 8); Drawing and Surveying (Civil Eng'g 2 and 3); Physics 1 and 3; Rhetoric 2; Military 2.

3. Integral Calculus (Math. 9); Drawing and Surveying (Civil Eng'g 2 and 3); Physics 1 and 3; Rhetoric 2; Military 2.

THIRD YEAR.

1. Analytical Mechanics (Theo. and Appl'd Mech. 1); Railroad Engineering (Civil Eng'g 4); Chemistry 1.

2. Resistance of Materials (Theo. and Appl'd Mech. 2); Railroad Engineering (Civil Eng'g 4); Road Engineering (Municipal and San. Eng'g 1); Steam Engines and Boilers (Mech. Eng'g 6).

3. Hydraulics (Theo. and Appl'd Mech. 3); Descriptive Astronomy (Astronomy 2); Roofs (Arch. 5).

FOURTH YEAR.

1. Masonry Construction (Civil Eng'g 5); Geodesy and Practical Astronomy (Civil Eng'g 6 and 7); Water Supply Engineering (Mun. and San. Eng'g 2): Thesis.

2. Bridge Analysis (Civil Eng'g 8): Sewerage (Mun. and San. Eng'g 3); Structural Details (Civil Eng'g 11): Thesis.

3. Bridge Designing (Civil Eng'g 8); Tunneling (Civil Eng'g 9); Geology 3; Thesis.

Electrical Engineering.

This course is intended to give to young men the best possible preparation for work in the practical applications of electricity. The instruction is given by lecture, laboratory practice, designing, and drafting. The student is encouraged to add to his general intellectual culture by systematic reading of the best periodical literature concerning the theory and the applications of electricity. By keeping himself informed about the best efforts of others in every department of his profession, it is hoped that he may be stimulated to independent thought and original investigation in his own field. To this end, a department reading room, at all times accessible to students in this course, has been recently established, where the leading American, English, French, and German journals of general physics and applied electricity are kept on file. The instructors and students meet weekly to discuss the leading articles in current numbers of these journals. A critical discussion of one or more papers is required of each senior and each junior twice a month.

This department has quarters in Engineering Hall and in the basement of University Hall. The class rooms, drafting rooms, seminary rooms, studies, and offices are in Engineering Hall. The rooms devoted to the laboratory practice in University Hall are the electrical measurement laboratory, the dynamo laboratory, the battery room, the photometry room, and the work shop.

The electrical measurements laboratory has masonry piers for the more sensitive instruments, and numerous conveniences indispensable to rapid and accurate measurements. In this laboratory the work relating to the measurement of current, resistance,

electromotive force, the standardizing of measuring apparatus, etc., is carried on. This laboratory has been supplied with apparatus from the leading makers at home and abroad. There are several forms of bridges, resistance boxes, testing sets, non-inductive and continuously variable rheostats, and certified standards of resistance; the leading forms of galvanometers and reading devices; single and subdivided condensers, standard cells and electrostatic voltmeters; hot wire instruments; electrodynamometers; current balances; watt-meters; ammeters and voltmeters for direct and alternating currents. Current is brought to this laboratory from the battery room and from the dynamo laboratory.

The dynamo laboratory is supplied with power from a sixty-horse-power steam engine, which is used exclusively for the experimental work of this department. In this laboratory are to be found the leading types of direct and alternating current dynamos and motors, with conveniences for making complete tests. The equipment includes a complete Thomson-Houston 300-light alternating current lighting plant, a complete Thomson-Houston 3-light arc lighting plant, a complete Brush 10-light arc lighting plant, a complete Edison 100-light incandescent plant, a small 500-volt direct current power plant, and a small single phase alternating current power plant.

The photometry room is fitted out with a complete electric light photometer, numerous types of incandescent and of direct and alternating current arc lamps, and conveniences necessary for making complete tests.

The battery room contains a large collection of primary cells, and several large batteries of the more important kinds of accumulators with arrangements for efficiency tests.

The work shop is supplied with an engine lathe, a speed lathe, grinder, etc., and a line of fine tools suited to the manufacture of special apparatus. An electric motor furnishes power for this room.

Course in Electrical Engineering.

Required for the Degree of B.S. in Electrical Engineering.

FIRST YEAR.

1. Advanced Algebra (Math. 2); Elements of Drafting and Sketching (Drawing, Gen. Eng'g 1 and 4); Shop Practice

(Mech. Eng'g 1): French 5, German 5, or English 1 and 2; Military 1 and 2.

2. Trigonometry (Math. 4): Descriptive Geometry (Drawing. Gen. Eng'g 2): Shop Practice (Mech. Eng'g 1): French 5, German 5, or English 1 and 2; Military 1 and 2.

3. Analytical Geometry (Math. 6); Descriptive Geometry and Lettering (Drawing, Gen. Eng'g 2, 3); Shop Practice (Mech. Eng'g 1): French 5, German 5, or English 1 and 2: Military 1, 2.

SECOND YEAR.

1. Differential Calculus (Math. 7): Elements of Machine Design (Mech. Eng'g 4); Shop Practice (Mech. Eng'g 2); Physics 1 and 3; Rhetoric 2; Military 2.

2. Advanced Analytical Geometry (Math. 8): Elements of Machine Design (Mech. Eng'g 4): Shop Practice (Mech. Eng'g 2): Physics 1 and 3; Rhetoric 2; Military 2.

3. Integral Calculus (Math. 9): Elements of Machine Design (Mech. Eng'g 4): Shop Practice (Mech. Eng'g 2): Physics 1 and 3; Rhetoric 2: Military 2.

THIRD YEAR.

1. Analytical Mechanics (Theo. and Appl'd Mech. 1): Mechanism (Mech. Eng'g 5): Chemistry 1: Electrical Measurement (Physics 4); Seminary (Elect. Eng'g 10a).

2. Resistance of Materials (Theo. and App'ld Mech. 2): Steam Engines and Boilers (Mech. Eng'g 6): Chemistry 3a or 16; Electrical Measurements (Physics 4): Seminary (Elect. Eng'g 10a).

3. Hydraulics (Theo. and Appl'd Mech. 3); Chemistry 3b, or Surveying (Civil Eng'g 10); Mechanical Engineering Laboratory (Mech. Eng'g 3): Electro-magnetism (Elect. Eng'g 2): Seminary (Elect. Eng'g 10a).

FOURTH YEAR.

1. Thermodynamics (Mech. Eng'g 7): Steam Engine Design and Valve Gears (Mech. Eng'g 11): Dynamo Electric Machinery (Elect. Eng'g 3); Seminary (Elect. Eng'g 10b): Thesis.

2. Alternating Current and Alternating Current Machinery (Elect. Eng'g 4); Photometry (Elect. Eng'g 5); Electrical Communication (Elect. Eng'g 6): Electro-metallurgy (Elect. Eng'g 7): Seminary (Elect. Eng'g 10b); Thesis.

3. Alternating Currents and Alternating Current Machinery (Elect. Eng'g 4); Lighting Plants (Elect. Eng'g 8); Electrical

Transmission of Power (Elect. Eng'g 9); Seminary (Elect. Eng'g 10b): Thesis.

Mechanical Engineering.

It is the object of this course to give the student a thorough training in the theoretical principles underlying the science of machines and mechanics, and at the same time to enable him to become practically familiar with some of the numerous applications of these principles which have become of such inestimable value to the human race.

Instruction.—The methods of instruction vary with the subjects under consideration. Text books, lectures, examples, drawing room work, technical readings, models, reports, laboratory and shop practice—all have important places.

It is the aim to keep the student interested in his work, with the belief that it is only under such a condition that he will receive the maximum benefit from his work.

A practical course in drawing and designing extends through the entire course of study.

Shop or laboratory practice is also a part of each term's work.

Equipment.—The equipment of this department is arranged for work under three heads—class and drawing room work, mechanical engineering laboratory, and shop practice. Engineering Hall being now completed, the facilities for class and drawing room work are unexcelled. The drawing rooms are equipped with modern desks, drawing boards, filing cabinets, card indexes, reference books, catalogues, odontographs, gear charts, tables, etc. Provision is made in the cabinet rooms for the exhibition of kinematic models and also sectioned steam specialties, many of them donated by the manufacturers.

Mechanical Engineering Laboratory.—This laboratory is now situated in the basement of the Chemical Laboratory. It contains engines, boilers, pumps, surface condenser, and a large assortment of indicators, gauges, scales, thermometers, dynamometers, calorimeters, reducing motions, planimeters, measuring tanks, and apparatus for the calibration of instruments. It is supplied with steam from the central boiler house through a 5-inch main, and steam may be used from this source or from boilers in the laboratory itself. The engines may be run either with or without a condenser, with plain slide or expansion valves, or with automatic or throttling governors.

Water is brought to the laboratory through a 2-inch main, furnishing a supply for condensers and boiler feed.

The heating and power plant of the University contains eight boilers: two Root, one Sterling, three horizontal tubular, and two Babcock & Wilcox, aggregating eight hundred horse power. These furnish additional opportunity for experiment. Tests are also made at the power plants, pumping station, and factories of the two cities.

The shops are situated in Machinery Hall, and are equipped as follows:

Machine Shop.— One twenty-seven inch by twelve foot bed, F. E. Reed & Co. engine lathe; twelve engine lathes of from twelve to twenty inch swing; two ten inch speed lathes; one centering lathe; one fifteen inch Gould & Eberhardt shaper; one fifteen inch Hendey shaper; one No. 3 Brown & Sharpe plain milling machine; one Brainard universal milling machine; one milling machine made in the shop; one twenty-four by twenty inch by five foot Putnam planer; one thirty by thirty inch by eight foot G. A. Gray & Co. planer; one No. 2 improved Brown & Sharpe universal grinding machine; one Brown & Sharpe cutter and reamer grinder; one twenty-four inch drill press; one twenty inch drill press; one sensitive drill press; one water emery tool grinder; one center grinding machine; one Stover power hack saw; complete sets of U.S. standard taps and dies; drills, arbors, reamers, gear and milling cutters, caliper gauges, calipers, scales, and other small tools.

Wood Shop.—Fourteen improved wood working benches fitted with tail screws and Wyman & Gordon patent vises; one thirty-four inch F. H. Clement & Co. band saw; one twenty inch Clement wood planer; eight ten inch wood lathes; one eighteen inch pattern maker's lathe; one No. 4 E. Fox trimmer; complete equipment of small tools.

Foundry.—The foundry is equipped with a small cupola, the necessary sand, ladles, crane, and flasks for making castings.

Forge Shop.—The forge shop contains sixteen forges fitted with power blast, exhaust fan, and the necessary small tools.

Power is furnished to the shops by an 8x10 Ball engine.

Course in Mechanical Engineering.

Required for the Degree of B.S. in Mechanical Engineering.

FIRST YEAR.

1. Advanced Algebra (Math. 2): Elements of Drafting and Sketching (Drawing, Gen. Eng'g 1 and 4); French 5, German 5, or English 1 and 2; Shop Practice (Mech. Eng'g 1); Military 1 and 2.

2. Trigonometry (Math. 4): Descriptive Geometry (Drawing, Gen. Eng'g 2): French 5, German 5, or English 1 and 2; Shop Practice (Mech. Eng'g 1); Military 1 and 2.

3. Analytical Geometry (Math. 6): Descriptive Geometry and Lettering (Drawing, Gen. Eng'g 2 and 3): French 5, German 5, or English 1 and 2: Shop Practice (Mech. Eng'g 1): Military 1 and 2.

SECOND YEAR.

1. Differential Calculus (Math. 7): Elements of Machine Design (Mech. Eng'g 4); Shop Practice (Mech Eng'g 2); Physics 1 and 3; Rhetoric 2: Military 2.

2. Advanced Analytical Geometry (Math. 8); Elements of Machine Design (Mech. Eng'g 4); Shop Practice (Mech. Eng'g 2); Physics 1 and 3: Rhetoric 2: Military 2.

3. Integral Calculus (Math. 9): Elements of Machine Design (Mech. Eng'g 4): Shop Practice (Mech Eng'g 2): Physics 1 and 3; Rhetoric 2: Military 2.

THIRD YEAR.

1. Analytical Mechanics (Theo. and Appl'd Mech. 1); Mechanism (Mech. Eng'g 5): Chemistry 1: Shop Practice (Mech. Eng'g 3).

2. Resistance of Materials (Theo. and Appl'd Mech. 2); Steam Engines and Boilers (Mech. Eng'g 6): Chemistry 16; Shop Practice (Mech. Eng'g 3).

3. Hydraulics (Theo. and Appl'd Mech. 3): Dynamo Electric Machinery (Elect. Eng'g 1): Surveying (Civil Eng'g 10); Mechanical Laboratory (Mech. Eng'g 3).

FOURTH YEAR.

1. Thermodynamics (Mech. Eng'g 7): Steam Engine Design and Valve Gears (Mech. Eng'g 11); Mechanical Laboratory (Mech. Eng'g 12); Seminary; Thesis.

2. Mechanics of Machinery (Mech. Eng'g 8): Advanced Machine Designs (Mech. Eng'g 9): Mechanical Laboratory (Mech. Eng'g 12); Seminary: Thesis.

3. Mechanics of Machinery (Mech. Eng'g 8): Original Designs (Mech. Eng'g 9): Estimates (Mech. Eng'g 10): Seminary; Thesis.

Municipal and Sanitary Engineering.

This course is designed for students desiring to make a specialty of city engineering work. It prepares for the varied duties of engineer of the department of public works of cities and includes instruction in modern methods of sanitation of cities.

Instruction.—Instruction is given by lectures, text-book, and seminary work; by field, laboratory, and drafting work. The methods of training are intended to develop power to take up and solve new problems connected with municipal public works, as well as to design and superintend the ordinary constructions. Surveying, structural materials, and structural design are taught as in the civil engineering course. The study of chemistry, botany, and bacteriology necessary to a comprehension of the questions involved in water supply and sewage disposal are given, and the facilities for this instruction are very good. The principles of the generation and transmission of electrical energy are given. Road engineering, water supply engineering, and sewerage receive special attention. A collection of drawings, plans, photographs, etc., has been added to the other equipment.

Course in Municipal and Sanitary Engineering.

Required for Degree of B.S. in Municipal and Sanitary Engineering.

FIRST YEAR.

1. Advanced Algebra (Math. 2): Elements of Drafting and Sketching (Drawing, Gen. Eng'g 1 and 4); Shop Practice (Mech. Eng'g 1); French 5, German 5, or English 1 and 2; Military 1 and 2.

2. Trigonometry (Math. 4): Descriptive Geometry (Drawing, Gen. Eng'g 2): Shop Practice (Mech. Eng'g 1); French 5, German 5, or English 1 and 2; Military 1 and 2.

3. Analytical Geometry (Math. 6): Descriptive Geometry and Lettering (Drawing Gen. Eng'g 2 and 3): Shop Practice (Mech. Eng'g 1): French 5, German 5, or English 1 and 2: Military 1 and 2.

SECOND YEAR.

1. Differential Calculus (Math. 7): Land Surveying (Civil Eng'g 1): Physics 1 and 3: Rhetoric 2: Military 2.

2. Advanced Analytical Geometry (Math. 8): Drawing and Surveying (Civil Eng'g 2 and 3): Physics 1 and 3: Rhetoric 2; Military 2.

3. Integral Calculus (Math. 9): Drawing and Surveying (Civil Eng'g 2 and 3); Physics 1 and 3: Rhetoric 2: Military 2.

THIRD YEAR.

1. Analytical Mechanics (Theo. and Appl'd Mech. 1): Railroad Engineering (Civil Eng'g 4): Chemistry 1.

2. Resistance of Materials (Theo. and Appl'd Mech. 2); Road Engineering (Mun. and San. Eng'g 1): Railroad Engineering (Civil Eng'g 4): Botany (Mun. and San. Eng'g 4); Steam Engines and Boilers (Mech. Eng'g 6, *half term*).

3. Hydraulics (Theo. and Appl'd Mech. 3): Roofs (Arch. 5); Dynamo Electric Machinery (Elect. Eng'g 1).

FOURTH YEAR.

1. Water Supply Engineering (Mun. and San. Eng'g 2): Bacteriology (Mun. and San. Eng'g 5): Masonry Construction (Civil Eng'g 5): Thesis.

2. Sewerage (Mun. and San. Eng'g 3): Bridge Analysis (Civil Eng'g 8): Chemistry 3a: Thesis.

3. Tunneling (Civil Eng'g 9): Bridge Designing (Civil Eng'g 8); Chemistry 20: Thesis.

PHYSICS.

The courses in this department are designed to furnish the student who intends to follow the profession of engineering, science teaching, or research in physical science, such a knowledge of the phenomena and laws of physics as may be of greatest use in the chosen calling.

Instruction.—The instruction is given by means of lectures and by practice in the laboratory. The work in the laboratory consists almost entirely of quantitative measurements made under the personal supervision of the instructors, with instruments

of precision. An effort is made to have each student determine for himself the relations existing between the facts which he has observed, in order to stimulate him to the formation of habits of sound thinking.

Equipment.—The rooms devoted to physics are in Engineering Hall. They include a large lecture room and cabinet, a large general laboratory and cabinet, several small laboratories, a constant temperature room, a battery room, a workshop, and several private studies, laboratories, and offices.

The lecture room is in the form of an amphitheater, and is furnished with opera chairs provided with tablet arms. Piers at the lecture desk and in center of room make demonstrations with the most delicate apparatus possible. A permanent screen and rolling blinds operated by a motor facilitate illustration by lantern.

The cabinet rooms adjoining the lecture room are stocked with apparatus suitable for illustration and demonstration, and are provided with conveniences for preparing apparatus for lectures.

The general laboratory is a large, well lighted, well ventilated room. It is supplied with tables, shelves, and sinks, arranged for general experimental work.

The cabinet room adjoining the general laboratory contains a full line of apparatus suitable for elementary experimental work, and also a line of high grade apparatus intended for advanced experimental work and research.

The small laboratories, six in number, are on the first floor. They are abundantly provided with masonry piers, wall shelves, sinks, dark curtains, etc. These rooms are now being equipped with apparatus for electrical measurements.

The constant temperature room is on the first floor. It is isolated from the surrounding space by double masonry walls and double doors. It is arranged for such experiments as require a low uniform temperature.

The workshop is also near the small laboratories. It is equipped with machines and tools for manufacture and repair of apparatus.

The private studies and laboratories are intended for the use of advanced students and instructors.

Electrical current is supplied to all the laboratories from the battery room and from the dynamo laboratory in University Hall.

Theoretical and Applied Mechanics.

The courses in theoretical and applied mechanics are designed to meet the needs of students of the College of Engineering. Training is given in the principles of the subject and in the application and methods used in engineering design and construction. The text-book work is supplemented by lectures and reading. Stress is placed on the solution of engineering problems involving discrimination in the use of data and in the statement of conditions. Experimental work and investigation in the laboratory of applied mechanics is a part of the regular instruction. Opportunity is also given for advanced laboratory investigation for thesis and special work.

Equipment.—The Laboratory of Applied Mechanics has an Olsen testing machine of 200,000 pounds capacity, arranged to test beams twenty feet long; a Riehle testing machine of 100,000 pounds capacity; a smaller apparatus for testing beams, Riehle and Olsen cement testing machines, a Riehle wire testing machine, extensometers and deflectometers, a stone grinding machine, a rattler for abrasion tests of stone and brick, with other apparatus for making all necessary measurements and observations, molds, standard sieves for cement, etc. The laboratory is fitted up as a working laboratory where students may acquire such practice in experimental work as engineers are called upon to perform, as well as for the purpose of illustrating principles, and also for use in original investigation. The ordinary work includes testing metals, wooden beams, cement briquettes, stone, and brick.

The hydraulic laboratory includes elevated tank and standpipe, steam pump for giving high pressure, tanks for measuring flow of water, pressure gauges, meters, water motor, turbine and other apparatus for experiments with orifices, weirs, pipes, nozzles, etc. The experiments are made in connection with the regular class instruction.

COLLEGE OF SCIENCE.

FACULTY.

ANDREW S. DRAPER, LL.D., PRESIDENT.
STEPHEN A. FORBES, PH.D., DEAN, Zoölogy.
THOMAS J. BURRILL, PH.D., Botany.
SAMUEL W. SHATTUCK, C.E., Mathematics.
CHARLES W. ROLFE, M.S., Geology.
DONALD MCINTOSH, V.S., Materia Medica.
ARTHUR W. PALMER, SC.D., Chemistry.
FRANK F. FREDERICK, Art and Design.
SAMUEL W. PARR, M.S., Applied Chemistry.
DANIEL W. SHEA, PH.D., Physics.
DAVID KINLEY, PH.D., Economics and Sociology.
DANIEL H. BRUSH, Captain 17th Infantry, U. S. A., Military Science.
WILLIAM J. ECKOFF, PD.D., PH.D., Pedagogy.
GEORGE W. MYERS, M.L., Mathematics.
KATHARINE MERRILL, A.B., English.
WILLIAM O. KROHN, PH.D., Psychology.
ELIZABETH C. BRUNER, A.B., German.
HENRY E. SUMMERS, B.S., Physiology.
EDGAR J TOWNSEND, PH.M., Mathematics.
EVARTS B. GREENE, PH.D., History.
ARTHUR H. DANIELS, PH.D., Philosophy.
HARRY S. GRINDLEY, SC.D., Chemistry.
GEORGE P. CLINTON, M.S., Botany.
T. ARKLE CLARK, B.L., Rhetoric.
WILLIAM E. SANDFORD, PH.C., SECRETARY, Pharmacy.
ALICE M. BARBER, M.S., Botany.
HERMAN S PIATT, A.M., French.
ALFRED H. WHITE, A.B., Chemistry.
FRANK SMITH, A.M., Zoölogy.
RALPH P. SMITH, PH.B., German.
HELEN E. BUTTERFIELD, M.L., Rhetoric.
JEREMIAH G. MOSIER, B.S., Geology.
FRED A. SAGER, B.S., Physics.
HARLEY E. REEVES, Military Science.
EDWARD J. LAKE, Art and Design.

AIMS AND SCOPE.

The College of Science is based upon the idea that the methods of science and the branches of study to which those methods are applicable present a subject matter and a discipline ample for the purposes of a liberal education, and that an education so derived differs materially in character and value from one whose sources are mainly literary. This College is distinguished in general from the technical colleges of the University by the fact that its choice of subjects is not limited by practical ends, and from the College of Literature and Arts by the predominance, in its courses and requirements, of the strictly scientific subjects. It is assimilated to the latter, however, by the liberal elections from the literary courses permitted to students who have satisfied its demands as to scientific work, and by the special courses in science open to election by students from the companion college.

It affords an opportunity for the study of the natural, physical, mathematical, and mental sciences, and of economic, sociological, and philosophical subjects, either as specialties or as the substance of a general education. The candidate for graduation may take a year each in any four of the principal subjects of this College, with a considerable amount of language, literature, and general study; he may concentrate his major work on any one of the several subjects in which major courses are offered; or he may adopt any program of concentration of his major work intermediate between these extremes. The subjects presented in this College are accordingly arranged in four groups—chemical, mathematical, natural science, and philosophical—each characterized by the predominant importance and development of the subjects indicated by its name. The studies of each group are again divided into required and elective subjects, and the latter are further subdivided into three lists, A, B, and C. All those of the required list are necessary to graduation in the group of studies specified; those of the elective lists A and B are open to election, restricted only by certain general requirements, varying in the different groups, regarding the amount and distribution of the work to be done on them; and those of list C are open to election unconditionally.

It is the purpose of this system of classification and requirements to permit large liberty of choice with respect both to

main lines of study and to associated or secondary subjects, and at the same time so to guide the student's elections that his course of study shall always contain a central core or axis of closely articulated major work. Preference is further given by this means to those minor subjects most important because of their relations to the major work elected.

The only undergraduate degree given in this College is that of Bachelor of Science. Forty* full term credits for University studies are required for graduation, two of which must be earned by investigation work, the results of which are to be presented in the final thesis. Credit will be given for fractions of courses of instruction in exceptional cases only, by vote of the College faculty.

EQUIPMENT.

Laboratories.—The College of Science occupies two of the main University buildings,—the Chemical Laboratory and Natural History Hall,—together with several rooms in University Hall assigned to the mathematical department, and to some of those of the philosophical group. The natural history museum is also in University Hall.

The laboratory and library facilities of this College have been acquired with primary reference to the needs of the undergraduate student, and are scarcely surpassed, for their purpose, in grade and completeness, among American universities. The graduate student likewise finds here an ample equipment, material, and opportunity for independent investigation in several departments of study, notably in those covered by the operations of the State Laboratory of Natural History and of the State Entomologist's office.

Apparatus.—A detailed description of apparatus will be found under each department of instruction.

THE CHEMICAL GROUP.

The purposes of the chemical group may be stated under three heads:—1, General; 2, Technological; and 3, Pharmaceutical.

1. Provision is made for such students as desire to direct their attention to the purely scientific side of the subject, either as part of a general education or with the view of preparing

*Forty-one in the chemical group.

themselves to become teachers of the physical sciences, or investigators in the various branches of pure chemistry.

2. The constantly growing demand for chemical knowledge and skill in the industrial world is here recognized and provided for. Ample opportunities are offered to those who wish to follow work along technological lines, special attention being given to the underlying chemical principles and their applications in the various industries.

3. Courses in pharmacy provide on the one hand for those who expect to engage in the ordinary practice of the pharmacist and druggist, and on the other, for such as wish to prepare in a more thoroughly scientific manner for the work of the investigating and manufacturing pharmacist.

Equipment.

Laboratories.—The chemical building is 75 by 120 feet and four stories high including basement and mansard. The basement is used for storage of general supplies, dispensing room, and for work in assaying and metallurgical chemistry. The first floor has a lecture room which seats 150; a laboratory for general chemistry and qualitative analysis which accommodates 150 students; and a large private laboratory, and a store room. The second floor has laboratories for quantitative analysis, organic chemistry, balance and reading room, a room for the special operations of physical chemistry, two private laboratories, a store room, and a small lecture room. The third floor has a laboratory for gas analysis, pharmacy and prescription rooms, a chemical museum, apartments for photography, a small lecture room, and the chemical laboratory of the Agricultural Experiment Station.

Apparatus.—These laboratories are amply furnished with all the modern conveniences and supplies for the various lines of work in pure and applied chemistry and pharmacy.

The apparatus for general use includes twenty-four analytical balances of Sartorius's and Becker's make, a large platinum retort for making hydrofluoric acid, Geissler's mercurial air pumps, Soleil-Scheibler's saccharimeter, a large Landolt's polariscope, Hofmann's, and Lepsius's apparatus for lecture demonstrations, complete sets of apparatus for gas analysis, spectroscopes, etc.

A very important feature of the equipment consists in the chemical library which, in addition to all the modern standard chemical texts, dictionaries, and encyclopedias, includes complete sets of nearly all the more important chemical journals, especially the German and the English. The current numbers of many others are regularly received.

Classification of Subjects.

PRESCRIBED.

1. *Chemical.*—Chemistry (1), 1 credit.
Descriptive Inorganic Chemistry (Chem. 2), 1 credit.
Elements of Organic Chemistry (Chem. 4), 1 credit.
Organic Chemistry (Chem. 9), 2 credits.
Qualitative Analysis (Chem. 3a, 3b), 2 credits.
Quantitative Analysis (Chem. 5a, 5b), 2 credits.
Seminary (Chem. 19).
2. *General.*—Advanced Algebra (Math. 1, 2), 1 credit.
German 1, 5, 6: 5 credits.
Military 1, 2: 2 credits.
Physics 1, 3: 3 credits.
Rhetoric 2: 2 credits.
Trigonometry (Math. 3 or 4), 1 credit.

ELECTIVES.

List A (Chemical).

Advanced General Chemistry (Chem. 7), 1, 2, or 3 credits.
Agricultural Chemistry (Chem. 13), 2 credits.
Chemical Technology (Chem. 6), 1 credit.
Iron and Steel Analysis (Chem. 8), 1 credit.
Industrial Chemistry (Chem. 17), 1 credit.
Metallurgy (Chem. 14), 1 credit.
Metallurgical Analysis and Assaying (Chem. 15), 1 credit.
Quantitative Analysis (Chem. 5c), 1 credit.
Sanitary Analysis (Chem. 10), 1 credit.
Special Courses (Chem. 18, a, b, c, d), $\frac{1}{5}$ to $5\frac{3}{5}$ credits.
Theoretical Chemistry (Chem. 12), 1 credit.
Thesis and Investigations (Chem. 11), 2 credits.

List B (General).

Botany 6, 1; 1 or 3 credits.
Electrical Engineering 1, 1 credit.
English 1, 2: 3 credits.
Greek 1 to 3: 3 credits.

Geology 4, 1: 1 or 3 credits.
Latin 1 to 3: 3 credits.
Mathematics 2 to 9: 3 or 4 credits.
Mechanical Engineering 1, 2, and 6: 1 or 2 credits.
Mineralogy 1, 2: 1 or 3 credits.
Physiology 4, 1: 1 or 2 credits.
Theoretical and Applied Mechanics 1 to 5: 1 to 3 credits.
Zoölogy 3, 1: 2 or 3 credits.

List C.

Anthropology 1: 1 credit.
Art and Design 5: 1 credit.
Astronomy 4: 1 credit.
Botany 2: 1 credit.
Chemistry (advanced work): 1 to 3 credits.
Economics 1 to 8; 2 to 6 credits.
French 1 or 5, 2: 3 or 6 credits.
German 2: 1 credit.
History 1, 2: $1\frac{1}{2}$ to 3 credits.
Materia Medica 1: 2 credits.
Meteorology 1: $\frac{1}{2}$ credit.
Military 3.
Pedagogy 1 to 7: 3 credits.
Philosophy 1 to 8: $\frac{2}{3}$ to 7 credits.
Psychology 1 to 7, 9: 1 to 8 credits.

Requirements for Graduation.

In order to graduate from the course in chemistry, the candidate must have completed all the required courses (23 credits), and must have at least six credits additional for subjects to be chosen from the chemical list A, of electives. For the twelve remaining credits he must choose six subjects from list B and six from lists B and C. He must make, in all, forty-one full term credits, and present an acceptable thesis.

Special exceptions as to the required number of chemical options may be made for those who desire to prepare themselves as teachers of chemistry rather than as technical chemists.

Courses of Instruction by Years and Terms.

The courses mentioned in the following list may be taken only in the term indicated. Prescribed studies are in italics and must be taken in the term and year indicated.

FIRST YEAR.

1. Advanced Algebra (Math. 1 or 2): *General Introductory Chemistry* (Chem. 1): *German* 5 or 1: *Military* 1, 2.

2. *Descriptive Inorganic Chemistry* (Chem. 2): *German* 5 or 1: *Military* 1, 2: *Trigonometry* (Math. 3 or 4): *Qualitative Analysis* (Chem. 3a).

3. *Analytical Geometry* (Math. 6); Conic Sections (Math. 5): *Descriptive Inorganic Chemistry* (Chem. 2); *Elements of Organic Chemistry* (Chem. 4): *German* 5 or 1: *Military* 2: *Qualitative Analysis* (Chem. 3b).

SECOND YEAR.

1. Art and Design 5: German 2: Differential Calculus (Math. 7): *Military* 2: Mineralogy 1: *Physics* 1, 3: *Quantitative Analysis* (Chem. 5a).

2. Advanced Analytical Geometry (Math. 8): Advanced General Chemistry (Chem. 7): Agricultural Chemistry (Chem. 13): Art and Design 5; Chemical Technology (Chem. 6); Geology 4, 1: *German* 6: Military 2; Physics (1, 3): *Quantitative Analysis* (Chem. 5b).

3. Advanced General Chemistry (Chem. 7): Agricultural Chemistry (Chem. 13): Art and Design 5; Chemical Technology (Chem. 6); Geology 1: *German* 6; Integral Calculus (Math. 9); *Military* 2: *Quantitative Analysis* (Chem. 5c): *Physics* 1, 3.

THIRD YEAR.

1. Advanced General Chemistry (Chem. 7): Botany 1: Differential Calculus (Math. 7): French 1, 5: Geology 1: History 1, 2: Iron and Steel Analysis (Chem. 8): Materia Medica 1: Metallurgical Analysis and Assaying (Chem. 15); Metallurgy (Chem. 14): Pedagogy 1, 2, 4, 5: Pharmacy 1, 3; Philosophy 1; Physiology 4: Psychology 2, 4: *Rhetoric* 2: *Seminary* (Chem. 19).

2. Advanced General Chemistry (Chem. 7): Botany 1: French 1, 5; Geology 4, 1: History 1, 2: Materia Medica 1: Mineralogy 2: *Organic Chemistry* (Chem. 9); Pedagogy 1, 2, 5, 7: Pharmacy 2: Philosophy 2, 4; Physiology 1; Psychology 2, 9; *Rhetoric* 2: *Seminary* (Chem. 19): Theoretical Chemistry (Chem. 12): Zoölogy 1, 3.

3. Advanced General Chemistry (Chem. 7): Botany 1, 6; French 1,5: Geology 1: History 1, 2: Materia Medica 1: Mineralogy 2: *Organic Chemistry* (Chem. 9); Pedagogy 3, 7; Pharmacy 2: Philosophy 3, 6, 7, 8: Physiology 1: Psychology 1, 5; *Rhetoric* 2: *Seminary* (Chem. 19): Theoretical Chemistry (Chem. 12); Zoölogy 1.

FOURTH YEAR.

1. Advanced General Chemistry (Chem. 7): Differential Calculus (Math. 7): English 1, 2: French 1. 2. 5: Geology 1: History 1. 2: Materia Medica 1: Metallurgy (Chem. 14): Metallurgical Analysis and Assaying (Chem. 15): Meteorology 1: Pedagogy 1, 2. 4. 5: Pharmacy 1, 3. 4: Philosophy 1. 5, Physiology 4: Psychology 2, 4. 7. 8: Sanitary Analysis (Chem. 10): *Seminary* (Chem. 19): Special Analytical Chemistry (Chem. 18): Zoölogy 1, 3.

2. Advanced General Chemistry (Chem. 7): English 1, 2: French 1, 5, 2: History 1, 2; Materia Medica 1; Pedagogy 1, 2, 5, 7; Pharmacy 2, 4: Philosophy 2, 4, 5: Physiology 1: Psychology 6, 7, 8: *Seminary* (Chem. 19): Special courses (Chemistry 18): *Thesis and Investigations* (Chem. 11): Zoölogy 1.

3. Advanced General Chemistry (Chem. 7): English 1, 2: French 1, 5, 2; History 1, 2; Materia Medica 1: Pedagogy 3, 7: Pharmacy 2, 3, 5: Philosophy 3, 6, 7, 8, Physiology 1: Psychology 5, 7, 8: *Seminary* (Chem. 19): Special courses (Chem. 18): *Thesis and Investigations* (Chem. 11).

COURSE IN APPLIED CHEMISTRY WITH ENGINEERING SUBJECTS.

To meet the requirements of those who wish to fit themselves for such work as devolves upon the managers of establishments in which the operations depend upon chemical processes, a four years' course in chemistry with related engineering subjects has been arranged.

REQUIREMENTS FOR GRADUATION.

Such electives in chemistry and engineering are to be chosen from lists A or B as shall satisfy the requirements for graduation in the chemical department. Further, the engineering subjects must include a minimum of three each from the departments of mathematics, theoretical and applied mechanics, and at least five subjects from other engineering departments. Completion of the work of this course leads to the degree of Bachelor of Science in Chemistry.

COURSE OF INSTRUCTION BY YEARS AND TERMS.

FIRST YEAR.

1. *Advanced Algebra* (Math. 1, 2): Drawing, Gen'l Eng'g, 1, 4; *General Chemistry* (Chem. 1): *German*, 1, 5: *Military*, 1, 2.

2. *Descriptive Inorganic Chemistry* (Chem. 2); *German*, 1, 5; *Military*, 1, 2: *Qualitative Analysis* (Chem. 3 a): *Trigonometry*, (Math. 3, 4).

3. Analytical Geometry (Math. 6); Descriptive Inorganic Chemistry (Chem. 2); Elements of *Organic Chemistry* (Chem. 4); *German*, 1, 5: *Qualitative Analysis* (Chem. 3 b): *Military*, 2.

SECOND YEAR.

1. Differential Calculus (Math. 7); *Military* 2; Mineralogy 1; *Physics* 1, 3; *Quantitative Analysis* (Chem. 5a); *Rhetoric* 2; Shop Practice (Mech. Eng'g 1).

2. Advanced Analytical Geometry (Math. 8): *German* 6: *Military* 2: *Physics* 1, 3; *Quantitative Analysis* (Chem. 5b): *Rhetoric* 2; Shop Practice (Mech. Eng'g 1).

3. *German* 6; Integral Calculus (Math. 9): Iron and Steel Analysis (Chem. 8); *Military* 2; *Physics* 1, 3: *Rhetoric* 2: Shop Practice (Mech. Eng'g 1).

THIRD YEAR.

1. Analytical Mechanics (Theo. and Appl'd Mech. 1 or 4): Metallurgy (Chem. 15): Metallurgical Analysis and Assaying (Chem. 14); Shop Practice (Mech. Eng'g 2); Special Analytical Chemistry (Chem. 18); *Seminary* (Chem. 19).

2. Chemical Technology (Chem. 6): Industrial Chemistry (Chem. 17); *Organic Chemistry* (Chem. 9): Resistance of Materials (Theo. and Appl'd Mech. 2 or 5); *Seminary* (Chem. 19): Steam Engines and Boilers (Mech. Eng'g 6); Shop Practice (Mech. Eng'g 2).

3. Chemical Technology (Chem. 6); Electrical Engineering 1; Geology 3; Hydraulics (Theo. and Appl'd Mech. 3); Organic Chemistry (Chem. 9): Special Analytical Chemistry (Chem. 18): *Seminary* (Chem. 19): Shop Practice (Mech. Eng'g 2).

FOURTH YEAR.

1. Chemistry 14, 15, 18; French 1, 5: History 1, 2; Thermodynamics (Mech. Eng'g 7).

2. Chemistry 6, 12, 17, 18; French 1, 5: History 1, 2; Mineralogy 2; Steam Engines and Boilers (Mech. Eng'g 6); *Thesis and Investigation* (Chem. 11).

3. Chemistry 6, 12, 18; Civil Engineering 1; French 1, 5; History 1, 2; Mineralogy 2; *Thesis and Investigations* (Chem. 11).

DESCRIPTION OF DEPARTMENTS.

Chemistry.

The chemical offerings include courses of instruction in general elementary, inorganic, organic, physical, and theoretical chemistry, and several lines of qualitative and quantitative analysis. See under *Chemistry* in List of Subjects.

The instruction in elementary chemistry is conducted upon the principle that whatever the ultimate purpose of the student may be, whether he is to become a technical chemist, a teacher of chemistry, or an investigator, or whether he studies chemistry as part of a liberal education, his approach to the subject should be upon the scientific and not upon the technical side.

In conformity with this principle, the minor course in elementary chemistry, Chemistry 1, which is primarily arranged for students of other departments, as a means of affording them in the minimum time a fair understanding of the fundamental principles of general chemistry, is required of all regular chemical students as a brief general view of, or introduction to, the science of chemistry.

After this first term the work becomes more technical in character, but the required chemical subjects of the course constitute a back-bone of sound scientific preparation such as insures the attainment of a thorough grounding in the principles and laws of chemistry, while by proper selection of the numerous electives one may specialize along any of the lines of applied chemistry or pharmacy, or develop further his knowledge of pure chemistry.

In order that an acquaintance with chemical literature may be had, and to keep pace with the advances in chemistry, students of the third and fourth years are required to take part in the chemical seminary in which the work consists chiefly of reviews and discussions of assigned articles in current numbers of the various journals.

Two terms' work in the fourth year are devoted to the investigation of some chemical problem. This practice both furnishes an opportunity to specialize along some chosen line and serves as an introduction to the methods of chemical research.

Applied Chemistry.

In this department there are offered ten separate courses in technological subjects. These require as preliminary work the

seven general and analytical courses from 1 to 5b inclusive. They may be further supplemented by special advanced work along some chosen line. For special description of courses see under *Chemistry* in the LIST OF SUBJECTS. Frequent visits are made to metallurgical and other works employing chemical processes. Seminary work along general and technical lines is conducted for two years of the course. The purpose of the course is to offer the largest possible opportunity for equipment as technical and manufacturing chemists, superintendents, etc., or as chemical engineers in the work of supervising or planning the installation of metallurgical or other chemical plants.

PHARMACY.

Two courses in pharmacy are offered, one covering two years and the other, which leads to the degree of Bachelor of Science, extending over four years. The former is designed particularly for those who intend engaging in pharmacy as a business. The four years course includes all the practical work of the shorter course, but extends farther, and furnishes a more complete training in the chemistry of pharmacy. The intention is to offer a thorough scientific training to students who desire to become pharmaceutical chemists, or chemists to the medical profession, to engage in manufacturing or to devote themselves to scientific investigation in pharmacy.

The instruction is conducted by means of lectures, text books, and laboratory work. The laboratory practice consists in the compounding of the galenicals, in pharmaceutical assaying, and in prescription work. The requirements of the United States Pharmacopœia are always kept in mind and the student must conform to its rules; he is, therefore, held responsible for the purity and strength of his preparations, and for the accuracy of his work.

EQUIPMENT.

The department of pharmacy occupies a part of the chemical building, and is in direct connection with the chemical laboratories. It has the use of the very complete supply of apparatus belonging to the chemical department, and is also provided with apparatus for the special work in pharmacy. All the various forms of percolators, pill machines, suppository moulds, tablet moulds, etc., are at the disposal of the student.

A drug room is arranged as nearly like the drug shop as is possible and contains a large prescription desk supplied with a complete set of apparatus and materials necessary for the compounding of prescriptions. It is designed to give the student as much practical work as is possible in a technical school. Over two hundred crude drugs make up a part of the equipment for the study of pharmacognosy.

Several of the leading journals of pharmacy are taken and these, together with the complete library of chemical and pharmaceutical works, afford excellent opportunities for examining the literature bearing on the science of pharmacy.

Requirements for Graduation.

With Degree of B.S. in course of Chemistry and Pharmacy.

The general requirements are the same as in the chemical course proper; more specifically there are required:

Botany 1, 1 to 3 credits.
Botany 7, 1 credit.
Chemistry 1, 2, 3, 4, 5a, 9, 8 credits.
German 5, 6, 5 credits.
Mathematics 1, 3, 2 credits.
Materia Medica 1, 2 credits.
Military 1, 2, 2 credits.
Pharmacy 1, 2, 3, 4, 5, 8 credits.
Pharmaceutical Assaying (Pharm. 5), 1 credit.
Pharmaceutical Preparations (Pharm. 2), 2 credits.
Pharmaceutical Technology (Pharm. 4), 2 credits.
Pharmacognosy (Pharm. 3), 2 credits.
Physics 1, 3, 3 credits.
Rhetoric 2, 2 credits.
Thesis and Investigation (Chem. 11), 2 credits.

The subjects of the four remaining credits which are required for graduation may be selected from chemical electives, lists A, B, and C.

Courses of Instruction by Years and Terms.

The courses mentioned in the following list must be taken in the indicated year and term:

FIRST YEAR.

1. *Advanced Algebra* (Math. 1): *Chemistry*, General Introductory (Chem. 1): *German* 5: *Military* 1, 2.

2. *Descriptive Inorganic Chemistry* (Chem. 2); *German* 5; *Military* 1, 2; *Qualitative Analysis* (Chem. 3a); *Trigonometry* (Math. 3).

3. *Descriptive Inorganic Chemistry* (Chem. 2); *Elements of Organic Chemistry* (Chem. 4); *German* (5); *Military* 1, 2; *Qualitative Analysis* (Chem. 3b).

SECOND YEAR.

1. *Botany* 1; *Pharmacy* 1; *Quantitative Analysis* (Chem. 5a); *Rhetoric* 2;

2. *Botany* 1, 7; *German* 6; *Pharmaceutical Preparations* (Pharm. 2); Quantitative Analysis Chem. 5b; *Rhetoric* 2.

3. Botany 1, 7; *German* 6; *Pharmaceutical Preparations* (Pharm. 2); Quantitative Analysis (Chem. 5c). *Rhetoric* 2.

THIRD YEAR.

1. *Materia Medica* 1; *Pharmacognosy* (Pharm. 3); *Physics* 1, 3; *Seminary* (Chem. 19).

2. *Materia Medica* 1; *Organic Chemistry* (Chem. 9); *Physics* (1, 3); *Seminary* (Chem. 19).

3. *Organic Chemistry* (Chem. 9); *Pharmaceutical Assaying* (Chem. 5); *Physics* (1, 3); *Seminary* (Chem. 19).

FOURTH YEAR.

1. Elective: Elective: *Pharmaceutical Technology* (Pharm. 4); *Seminary* (Chem. 19).

2. Elective, *Pharmaceutical Technology* (Pharm. 4); Investigation and Thesis (Chem. 11); *Seminary* (Chem. 19).

3. Elective: Pharmacognosy (Pharm. 3b); Investigation and Thesis (Chem. 11); *Seminary* (Chem. 19).

Short Course in Pharmacy.

A briefer course in pharmacy is offered, covering two years. The subjects are all prescribed and are as follows:

FIRST YEAR.

1. Botany 1; General Introductory Chemistry (Chem. 1); Military 1, 2; Pharmacy 1; Pharmacognosy (Pharm. 3).

2. Descriptive Inorganic Chemistry (Chem. 2); Military 1, 2; Pharmaceutical Botany (Bot. 7); Pharmaceutical Preparations (Pharm. 2); Qualitative Analysis (Chem. 3a).

3. Military 1, 2; Organic Chemistry (Chem. 4); Pharmaceutical Botany (Bot. 7); Pharmaceutical Preparations (Pharm. 2); Qualitative Analysis (Chem. 3 b).

SECOND YEAR.

1. Advanced work in Chemistry or Pharmacy: Materia Medica 1: Military 2: Pharmaceutical Technology (Pharm. 4); Quantitative Analysis (Chem. 5a).

2. Advanced work in Chemistry or Pharmacy: Materia Medica 1: Military 2: Pharmaceutical Technology (Pharm. 4): Quantitative Analysis (Chem. 5b).

3. Advanced work in Chemistry or Pharmacy: Military 2: Pharmaceutical Assaying (Pharm. 5): Pharmacognosy (Pharm. 3b): Thesis.

By an earnest prosecution of the studies laid out in this course the student may thoroughly prepare himself for the examinations required by the State Board of Pharmacy for registration as a pharmacist.

The work outlined above leaves no time during the college year for the drug store practice required by law for a registered pharmacist. This practice must therefore be had at other times, preferably before the college course.

THE MATHEMATICAL GROUP.

The mathematical group of studies includes the entire offering of the University courses in pure mathematics, physics, and astronomy.

The instruction in pure mathematics has for its object the promotion of habits of mental concentration and continuity of thought, the development of the capacity to form and combine abstract conceptions and the cultivation of deductive reasoning, and to give such mathematical knowledge as is required for the study of the professional work in the College of Engineering. For this last purpose the greater part of the time is necessarily taken up with the theory and its application to geometrical magnitudes. It is hoped that the course thus planned will meet the requirements of those who need mathematics as a tool, of those who wish to fit themselves for instructors, and of those who study the science for the love of it.

Parallel with the pure mathematics of the junior and senior years, two lines of associated work in applied mathematics—physical and astronomical—are offered, either of which may be, and one of which must be, taken by the student wishing to graduate in the studies of the mathematical group. One of these lines leads from the physics of the sophomore year through the math-

ematical theory of electricity and magnetism, heat, light, and sound; and the other through surveying and mechanics to celestial mechanics and to general and mathematical astronomy. Courses 10 to 18 count as graduate work for all students except those taking their first degree in mathematics.

Classification of Subjects.

Prescribed.

General Engineering Drawing 1, 4. 1 credit.
General Engineering Drawing 2, 3. 2 credits.
Mathematics 2 (Advanced Algebra), 1 credit.
Mathematics 4 (Trigonometry), 1 credit.
Mathematics 6 (Analytical Geometry), 1 credit.
Mathematics 7 (Differential Calculus), 1 credit.
Mathematics 8 (Advanced Analytical Geometry) 1 credit.
Mathematics 9 (Integral Calculus,) 1 credit.
Mathematics 10 (Theory of Equations), 1 credit.
Mathematics 11 (Theory of Determinants), 1 credit.
Mathematics 12 (Theory of Invariants), 1 credit.
Mathematics 13 (Theory of Functions), 1 credit.
Mathematics 14 (Method of Least Squares). ½ credit.
Mathematics 15 (Seminary and Thesis), 1½ credits.
Mathematics 16 (Differential Equations), 2 credits.
Mathematics 17 (Geometry of Space), 1 credit.
Mathematics 18 (Higher Plane Curves). 1 credit.
German 1, 2, 5, 6, or French 1, 2, 5, 6 credits.
Military Science 1, 2, 2 credits.
Physics 1, 2 credits.
Rhetoric 2, 2 credits.

List A. (Astronomical.)

Astronomy (Descriptive), 1 credit.
Astronomy (Mathematical), 1½ credits.
Civil Engineering 10, 1 credit.
Mechanics (Celestial), 1 credit.
Mechanics (Theoretical and Applied 1), 1 credit.

List B. (Physical.)

Physics 1, 3, 3 credits.
Physics 5 (Theory of Electricity and Magnetism), 3 credits.
Physics 6 (Theory of Light, Heat, and Sound), 3 credits.

List C.

Anthropology 1, 1 credit.
Biology, General 1, 1 credit.
Botany 1 or 6, 1 or 3 credits.
Chemistry 1, 3a, 3b, or 4, 1 or 3 credits.
Economics 1 to 8, 2 to 6 credits.
English 1, 2, 3 credits.
French 1, 5, 2, or German 1, 5, 2, 6, 6 credits.
Geology 1, 3, 4, 1 or 3 credits.
History 1, 2, 1 or 3 credits.
Latin 1, 2, 3, 3 credits.
Meteorology 1, $\frac{2}{5}$ credit.
Mineralogy 1, 2, 1 or 3 credits.
Pedagogy 1 to 7, 1 to 4 credits.
Philosophy 1 to 8, 1 to 4 credits.
Physiology 1 or 4, 1 or 3 credits.
Psychology 1 to 8, 1 to 4 credits.
Zoölogy 1 or 8, 1 or 3 credits.

Requirements for Graduation.

To graduate as a Bachelor of Science in the mathematical studies, it will be necessary for the student to complete the required subjects of this group, together with those of either the astronomical or the physical list (A or B) of electives. The necessary number of forty full-term credits for University studies may be made up by election from lists A, B, and C.

Courses of Instruction by Years and Terms.

The subjects of the mathematical group will be taught at present according to the following tabular arrangement. Subjects whose names are italicized must be taken in the year indicated.

FIRST YEAR.

1. *Engineering Drawing* 1, 4; *French* 1, *or German* 1, 5; *Mathematics* 2; *Military* 1, 2; *Rhetoric* 2.

2. *Engineering Drawing* 2; *French* 1, *or German* 1, 5; *Mathematics* 4; *Military* 1, 2; *Rhetoric* 2.

3. *Engineering Drawing* 2, 3; *French* 1, *or German* 1, 5; *Mathematics* 6; *Military* 2; *Rhetoric* 2.

SECOND YEAR.

1. *French* 2, *or German* 2; *Mathematics* 7; *Military* 2; *Physics* 1, 3.

2. *French* 2, *or German* 2, 6; *Mathematics* 8; *Military* 2; *Physics* 1, 3.

3. *Civil Engineering* 10; *French* 2, *or German* 2, 6; *Mathematics* 9; *Military* 2; *Physics* 1, 3.

THIRD YEAR.

1. Botany 1; Chemistry 1; Economics 1; History 1, 2; Latin 1; *Mathematics* 10; *Theoretical and Applied Mechanics* 1; Meteorology 1; Mineralogy 1; Pedagogy 1, 2, 4, 5; Philosophy 1; *Physics* 5; Physiology 4; Psychology 2, 4.

2. *Astronomy* 1; Botany 1; Chemistry 3a; Economics 1; Geology 1; History 1, 2; Latin 2; *Mathematics* 11; Mineralogy 2; Pedagogy 1, 2, 5, 7; Philosophy 4; *Physics* 5; Physiology 1; Psychology 2, 3, 6; Zoölogy 1, 2, 3, 6.

3. Astronomy 2; Botany 1; Chemistry 3b, 4; Economics 2, 5, 7; Geology 1; History 1, 2; Latin 3; *Mathematics* 12; Mineralogy 2; Pedagogy 3, 7; Philosophy 3, 6, 7, 8; *Physics* 5; Physiology 1; Psychology 1, 5; Zoölogy 1, 2.

FOURTH YEAR.

1. Anthropology 1; *Astronomy* 3; Botany 1, 2; Chemistry 1; Economics 1, 3, 6; Geology 1; History 1, 2, 3, 4, 5; *Mathematics* 13, 14, 15; Meteorology 1; Mineralogy 2; Pedagogy 1, 2, 3, 4, 7, 8; Philosophy 1, 5; *Physics* 6; Physiology 2, 4; Psychology 1, 2, 4, 7; Zoölogy 1, 3, 6.

2. *Astronomy* 3; Botany 1, 3; Chemistry 3a; Economics 1, 3, 6; History 1, 2, 3, 4, 6; *Mathematics* 15, 16, 17; Mineralogy 2; Pedagogy 1, 2, 3, 7; Philosophy 4, 5; *Physics* 6; Physiology 2; Psychology 2, 3, 6, 7; Zoölogy 2, 4, 5, 6.

3. *Astronomy* 3; Botany 1, 4; Chemistry 3b, 4; Economics 2, 4, 5, 7; General Biology 1; History 1, 2, 3, 7; *Mathematics* 15, 16, 18; Mineralogy 2; Pedagogy 3, 5, 7, 8; Philosophy 3, 4, 5, 6, 7, 8; *Physics* 6; Physiology 2; Psychology 5, 7; Zoölogy 2, 4, 6.

SUGGESTIONS CONCERNING COURSES OF STUDY.

The studies of the mathematical group may best be taken according to the following outlines of courses in mathematics and physics, and in mathematics and astronomy respectively.*

*The two courses are identical for the freshman and sophomore years.

The electives provided for in the junior and senior years may be readily chosen by a reference to the preceding lists of electives and to the scheme or table of subjects by years and terms.

Course in Mathematics and Physics.

FIRST YEAR.

1. Advanced Algebra; Engineering Drawing; French or German; Military; Rhetoric 2.
2. Trigonometry, Descriptive Geometry, and Lettering; French or German; Military; Rhetoric 2.
3. Analytical Geometry; Descriptive Geometry; French or German; Military; Rhetoric 2.

SECOND YEAR.

1. Differential Calculus; Physics 1, 3; French or German; Military.
2. Advanced Analytical Geometry; French or German; Military; Physics 1, 3.
3. Integral Calculus; French or German; Military; Physics 1, 3, or Surveying.

THIRD YEAR.

1. Theory of Equations; Physics 5; Electives.
2. Theory of Determinants; Physics 5; Electives.
3. Theory of Invariants; Physics 5; Electives.

FOURTH YEAR.

1 Theory of Functions; Method of Least Squares; Physics 6; Mathematical Seminary and Thesis; Electives.
2. Differential Equations; Geometry of Space; Physics 6; Mathematical Seminary and Thesis; Electives.
3. Differential Equations; Higher Plane Curves; Physics 6; Mathematical Seminary and Thesis; Electives.

Course in Mathematics and Astronomy.

The freshman and sophomore years are the same as in the preceding course.

THIRD YEAR.

1. Theory of Equations; Mechanics; Electives.
2. Theory of Determinants; Celestial Mechanics; Electives.

3. Theory of Invariants: General Astronomy: Electives.

FOURTH YEAR.

1. Theory of Functions: Method of Least Squares; Mathematical Astronomy; Mathematical Seminary and Thesis: Electives.

2. Differential Equations: Geometry of Space: Mathematical Astronomy: Mathematical Seminary and Thesis: Electives.

3. Differential Equations: Higher Plane Curves: Mathematical Astronomy: Mathematical Seminary and Thesis: Electives.

THE NATURAL SCIENCE GROUP.

The courses of the natural science group are especially intended:

1. To give a thorough liberal education with a basis in the objective sciences.

2. To prepare for the pursuit of specialties in zoölogy, entomology, physiology, botany, or geology, as a scientific career.

3. To lay in biological work and study a liberal foundation for a course in medicine.

4. To prepare for the teaching of the natural or physical sciences in high schools and colleges.

Special advantages are offered to graduate students, for whose work the museums, laboratories, and libraries, and the field and experimental equipment of the University and of the associated State Laboratory of Natural History, furnish an extraordinarily full provision.

Classification of Subjects.

PRESCRIBED.

Art and Design 4, 2 credits.
Chemistry 1, 3a, and 3b or 4, 3 credits.
German 1, or 5, 6, 5 credits.
Mathematics 1—6, 2 credits.
Military Science 1, 2, 2 credits.
Rhetoric 2, 2 credits.

ELECTIVES.

*List A** (Major Courses).

Biology General 2, 1 credit.
Botany 1 to 5: 3, 4, 6, or 9 credits.

*No number of credits in any subject will be accepted as major work, other than the numbers specified against that subject in list A. Credit will not be given for both major and minor work in the same subject.

Chemistry 5, 7, 9, 12, 3 credits.
Geology 1, 2, 3 or 5 credits.
Mineralogy 1, 2, 1 or 3 credits.
Physics 1, 3, 3 credits.
Physiology 1, 2, 3: 2, 3, or 7 credits.
Zoölogy 1, 2*, 3†, 4 to 7, 9, 3 to 9 credits.

*List B** (Minor Courses).

Botany 6, 1 credit.
Geology 4, 1 credit.
Physics 2, 1 credit.
Physiology 4, 1 credit.

List C (Miscellaneous).

Anthropology 1, 1 credit.
Art and Design 1, 1 credit.
Astronomy 4, 1 credit.
Biology 1, General, 1 credit.
Economics 1 to 8, 2 to 8 credits.
English 1, 2, 5, 6, 3 or 6 credits.
French 1, 2, 5, 3 or 6 credits.
German 2, 1 credit.
History 1, 2, 3, 3 or 6 credits.
Materia Medica 1, 3 credits.
Mathematics 5 to 11, 4 credits.
Meteorology 1, ½ credit.
Pedagogy 1 to 8, 2 to 10 credits.
Philosophy 1 to 8, 1 to 7 credits.
Psychology 1 to 8, 1 to 9 credits.

The major and minor courses in Lists A and B in this group are respectively the maximum offerings and the minimum requirements in the various subjects of these lists.

Requirements for Graduation.

No student may graduate in natural science until he has completed all the required courses, has done at least nine terms' work on one major elective, or twelve terms' work on more than

*Credited as major work only when followed by zoology 6.
†Credited as major work only when followed by physiology 1.

one such major (list A), has taken at least minor courses in all the other electives in which such courses are offered (list B), and has prepared and handed in a thesis acceptable to the Faculty of the College and of the University. The necessary number of forty full-term credits for University studies may be made up by additional elections from the three lists of electives, except that at least five of them must be chosen from list C.

Courses of Instruction by Years and Terms.

The courses mentioned in the following list must be taken in the term indicated, and should be taken also in the designated year, if practicable. Those whose names are italicized are required, at least in some courses, for graduation: those in roman type are electives. (See list above).

FIRST YEAR.

1. *Advanced Algebra* (Math. 1, 2); *Art and Design* 4; *Chemistry* 1; French 1, 5; *Military* 1, 2.

2. Chemistry 3a; French 1, 5; Military 1, 2; Trigonometry (Math. 3, 4); Zoölogy 1, 2, 3.

3. Analytical Geometry (Math. 5, 6); Art and Design 4; Astronomy 4; Botany 6; Chemistry 3b, 4; Entomology, Practical, (Zoöl. 8); French 1, 5; Military 2, 3; Zoölogy 1, 2.

SECOND YEAR.

1. Botany 1; Chemistry 5a; Differential Calculus (Math. 7); French 2; German 5; Military 2, 3; Mineralogy 1; Physics 1, 3; Physiology 4; Zoölogy 1, 3, 5.

2. Biology, General 1; Botany 1; Chemistry 5b, 9; Embryology (Zoöl. 4); Entomology (Zoöl. 6); French 2; Geology 1; German 5; Mathematics 8; Military 2, 3; Physics 1, 2, 3; Physiology 1.

3. Botany 1; Biology, General, 2; Botany 1, 6; Chemistry 5c, 7, 9; Entomology (Zoöl. 6); French 2; Geology 1; German 5; Integral Calculus (Math. 9); Military 2, 3; Physics 1, 3; Physiology 1.

THIRD YEAR.

1. Bacteriology (Bot. 2); Chemistry 7; Economics 1, 6; Entomology, Advanced (Zoöl. 7); Geology 1; German 2; History 1, 2; Meteorology 1; Military 3; Mineralogy 1; Pedagogy 1, 2, 5; Philosophy 1; Physiology 2; Psychology 2, 4; Rhetoric 2; Zoölogy 5.

2. Biology, General 1; Botany 3; Chemistry 7, 9; Embryology (Zoöl. 4); Entomology (Zoöl. 6); Zoölogy 7; Economics 1, 6; Geology 4; German 6; History 1, 2; Military 3; Mineralogy 2; Pedagogy 1, 2, 4, 5, 7; Philosophy 2, 4; Physiology 2; Psychology 2, 3, 6, 9; Rhetoric 2; Zoölogy 5.

3. Biology, General 2; Botany 4; Chemistry 7, 9; Economics 2, 5, 7; Entomology (Zoöl. 6); Zoölogy 7, 8; German 6; History 1, 2; Military 3; Mineralogy 2; Pedagogy 3, 7; Philosophy 3, 6, 8; Physiology 2; Psychology 5; Rhetoric 2; Zoölogy 5.

FOURTH YEAR.

1. Economics 1, 3, 6; History 3, 5; Pedagogy 1, 2, 4, 5, 8; Philosophy 1, 5; Psychology 2, 4, 7, 8; Thesis (Bot. 5, Zoöl. 9).

2. Anthropology 1; Economics 1, 3, 6; History 3, 6; Pedagogy 1, 2, 5, 7; Philosophy 2, 4, 5; Psychology 2, 3, 6, 7, 9; Thesis (Bot. 5, Geol. 2, Physiol. 3, Zoöl. 9).

3. *Biology, General* (2); Economics (4, 5, 7, 8); History (3, 7); Pedagogy (3, 5, 7); Philosophy (3, 6, 7, 8); Psychology (1, 5, 7); *Thesis* (Bot. 5, Geol. 2, Physiol. 3, Zoöl. 9).

Suggestions as to Specialization.

Those wishing to concentrate their major work in zoölogy only, may take courses 1 and 4 to 6 in zoölogy, beginning with the second term of the freshman year, minor courses in physiology, physics, and botany in the second year, meteorology or mineralogy 1 and geology 4 in the third year, and anthropology, general biology 1, and thesis investigation during the senior year.

For a zoölogical course with principal reference to entomology, zoölogy 2 may be taken instead of 1, and course 4 omitted from the above list.

The student desiring to specialize in physiology should take zoölogy 3 and follow it with all the physiology offered, except course 4. His work may be otherwise like that suggested above for the zoölogical specialist, with the omission of minor physiology.

A special course in botany may be made up on lines similar to those of the special zoölogical course by taking, instead of major zoölogy, the botanical courses 1 to 4 in the second and third years, preceded by general biology 1 in the freshman year, and followed by botany 5 (thesis work).

Students who desire to make the most of the offerings in geology are advised to take chemistry in the freshman year, begin their mineralogy in the fall term of the sophomore year, take geology in the winter and spring terms of that year, and the fall term of the junior year, and finish their mineralogy during the winter and spring terms of the junior year.

SPECIAL COURSES PRELIMINARY TO MEDICINE.

Students desiring a course of study leading to a degree in natural science as a liberal preparation for a course in medicine, are advised to take the list of studies required for graduation (16 credits), together with zoölogy 3, embryology (zoölogy 5), physiology 1 (or 1 and 2), general biology 2, botany 6, bacteriology (botany 2), physics 1 and 2, mineralogy 1, geology 4, materia medica 1, psychology 3, logic (philosophy 8), and thesis work on a morphological or physiological subject.

This course may be conveniently arranged as follows:

Major Course.

FIRST YEAR.

1. *Advanced Algebra* (Math. 1); *Art and Design* 4; *Chemistry* 1; *Military* 1, 2.
2. *Chemistry* 3a; *Military* 1, 2; *Trigonometry* (Math. 3); Zoölogy 3.
3. *Art and Design* 4; Botany 6; *Chemistry* 4; *Military* 2.

SECOND YEAR.

1. *German* 5; *Military* 2; Physics 1, 3; Zoölogy 3.
2. *German* 5; *Military* 2; Physics 1, 3; Physiology 1.
3. *German* 5; *Military* 2; Physics 1, 3; Physiology 1.

THIRD YEAR.

1. Bacteriology (Bot. 2); French 5 or Physiology 2; *German* 2; *Rhetoric* 2.
2. French 5 or Physiology 2; *German* 6; Psychology 3; *Rhetoric* 2; Zoölogy 4.
3. Biology, General 2; French 5 or Physiology 2; *German* 6; *Rhetoric* 2.

FOURTH YEAR.

1. Materia Medica 1 or Pharmacognosy (Pharm. 3); Mineralogy 1; Thesis.

2. Geology 4; Materia Medica 1 or Psychology 6 and Botany 3; Thesis.

3. Materia Medica 1 or Pharmacognosy (Pharm. 3); Philosophy 8; Thesis.

For the benefit of those who are preparing for medicine but who cannot take more than a two years' course at the University, the following scheme of study is suggested:

Minor Course.

FIRST YEAR.

1. Advanced Algebra (Math. 1); Art and Design 4; Chemistry 1; Military 1, 2.

2. Chemistry 3b; Military 1, 2; Trigonometry (Math. 2); Zoölogy 3;

3. Astronomy 4; Botany 6; Chemistry 4; Military 2.

SECOND YEAR.

1. Bacteriology (Bot. 2); Military 2; Physics 1, 3; Zoölogy 3.

2. Embryology (Zoöl. 5); Military 2; Physics 1, 3; Physiology 1.

3. Biology 2, General; Military 2; Physics 1, 3; Physiology 1.

DESCRIPTIONS OF DEPARTMENTS.

Botany.

Six courses of instruction are offered in this subject—five primarily intended to meet the wants of students making botanical work more or less a specialty, and the sixth occupying a single term, complete in itself, for students whose chief attention is given to other branches. Three to nine terms' work constitutes a major course; that of the single term, course 6, a minor course. To a very large extent natural objects are studied rather than books, but constant endeavor is made to introduce students to pertinent existing literature. In the laboratory much use is made of the compound microscope, and special attention is given to its manipulation for best results, and to the preparation of objects.

EQUIPMENT.

The botanical laboratories are: One of large size with full equipment of microscopes, microtomes, aquaria, models, charts, etc., for general work; one specially arranged and fitted up for bacteriological instruction and investigation, supplied with sterilizers, thermostats, microscopes, a full line of glassware, metal vessels, and chemicals: one adjoining the latter and used in connection with it for physiological botany, now in course of equipment with special apparatus and facilities: and an instructor's private laboratory. The department is furnished with a lecture room, work and storage rooms, offices, dark room for photography, and a room for the herbarium, all in convenient association and provided with the necessary materials and apparatus for ordinary class work and for advanced research. Special attention has been given to parasitic fungi: and the collections of specimens and of the literature upon the subject are ample for various lines of original investigation.

GEOLOGY AND MINERALOGY.

In this department four courses are offered in geology and two in mineralogy. For those students who wish more than a general acquaintance with these subjects a major course covering thirty-six weeks of class room and laboratory instruction has been arranged in each, and a supplementary course of twenty-two weeks is offered to those who select a geological subject for a thesis.

Engineers who wish an acquaintance with those portions only of geology which bear most strictly on their future work are offered a minor course of eleven weeks.

A minor course of eleven weeks is offered to those who desire merely an outline of the most prominent facts and theories of geology with some idea of the methods by which the geologist arrives at his conclusions. In mineralogy one term's work may be taken for a similar purpose.

EQUIPMENT.

Apparatus.—The mineralogical laboratory contains individual desks for twenty-four students, each of which is furnished with reagent bottles, Bunsen burners, and all the other apparatus, nowadays considered necessary to a complete outfit for blowpipe work in a first-class laboratory. It is also provided with a

spectroscope: a specific gravity balance: an analytical balance: a trip scale; mortars (diamond, agate, wedgwood, and iron); a chemical hood equipped with sink and a complete set of reagents and apparatus for qualitative analysis: a blast lamp and blower.

The advanced laboratories, two in number, are equipped with individual desks for sixteen students each supplied with apparatus as above: goniometers; microscopes; crystal models (550): thin sections of minerals and rocks (570); an apparatus for cutting and grinding thin sections of rocks, with a Jenney motor; a self-registering barometer; an aneroid barometer, and a telescopic hand level for topographic work.

For the recitation room there is a set of Keipert's physical maps; Ramsay's orographic map of the British Isles: Haart's Alps; Chauvauni's Asia: geological and soil maps of Illinois; a series of geological maps of the United States representing land development during the successive periods; a set of charts illustrating orography, erosion, deposition of metals, etc.: a series of relief maps: a complete lantern outfit with microscope and solar attachment: four hundred lantern slides: an equipment for photography and the manufacture of lantern slides.

Materials.—The collection of fossils comes principally from the palæozoic, but includes a representative series from the higher groups. It contains 43,400 specimens requiring 9,600 labels. Six hundred and fifty of the types described in the reports of the Illinois geological survey are included, and also 200 thin sections of corals and bryozoa.

The collection of minerals contains 7,109 specimens, and that of rocks 2,432 specimens among which is a large number of polished granites, marbles, and other ornamental building stones.

There is also a collection of Illinois soils containing 76 specimens, and a large collection of Illinois clays with their manufactured products.

Physiology.

The main special objects of the courses in human physiology are as follows: (1) to give to prospective students of medicine a detailed practical knowledge of the normal histological structure and vital processes of the body and a working familiarity with the instruments of precision of use in the investigation of disease. (2) To give to students of all branches of biology a

training in deducing logically necessary conclusions from data obtained by their own observations. (3) To furnish such a knowledge of physiology as will serve as a basis for future studies in hygiene.

The laboratory method of instruction is chiefly followed, supplemented, when desirable, by lectures, demonstrations, references to standard literature, and recitations. The laboratory work predominates in the major and advanced courses; the lectures, demonstrations, and recitations in the minor course. In the more advanced courses each subject is treated, so far as time will permit, as if it were an original investigation. The student is guided to the best methods to be pursued, but the results are left for him to discover. At frequent intervals the results obtained are reviewed by the instructor, and, when necessary, completed, unified, and correlated with the facts learned from previous investigation, care being taken to show the student wherein and why he failed to obtain a full knowledge of the subject.

EQUIPMENT.

The department of physiology occupies four rooms in Natural History Hall: a general laboratory, a lecture room, and a private laboratory on the top floor, and an animal room in the basement. The general laboratory, thirty-five by fifty-six feet, is fitted at one end with desks of the most approved pattern for chemical and other similar work, and at the other end with heavy tables, especially designed for use with the microscope and other apparatus requiring a stable support. The private laboratory and preparation room of the instructor is furnished with cupboards for apparatus and reagents.

The apparatus of the department may be roughly divided into three classes: That for physico-physiological work, that for chemico-physiological work, and that for the mammalian anatomy and histology necessarily taught in connection with the physiology proper. In the first class may be mentioned a Ludwig Kymograph (Zimmermann's latest model) with automatic movement of the cylinder in the line of its axis, and an arrangement for varying the period of rotation from one revolution in two seconds to one per hour. Using the kymograph in conjunction with other apparatus tracings are obtained showing the form and time elements of the different movements of the body (cardiac, respiratory, muscular, etc.), and measure-

ments are made of the rate of transmission of pulse waves, nerve currents, etc. With the assistance of a tuning fork, kept in vibration electrically, and a Deprez signal (made by Verdin), these measurements are accurate to within one two-thousandth of a second. A moist chamber (made by the Cambridge Scientific Instrument Co.), with platinum and non-polarizable electrodes, is used in the study of the properties of muscle. Other instruments are a Fleischl spectropolarimeter, a Gower's hæmacytometer, a Gower's hæmaglobinometer, a spectroscope, and a Lautenschläger oven, with automatic temperature regulator.

The apparatus for the chemical side of the subject, although in the aggregate important and costly, is composed largely of small pieces, too numerous for individual mention. Among them may, however, be named a set of Hempel's apparatus for gas analysis, and a Knop azotometer, the last used mostly in urinary analysis.

For the measurements of mass, volume, temperature, barometric pressure, specific gravity: etc., so constantly necessary in both the physical and chemical work, the laboratory is well supplied with apparatus of the best construction, including Sartorius balance, flasks and pipettes, thermometers, hydrometers, picnometers, etc.

For illustrative purposes in anatomy and histology the department has an Auzonx manikin, a human skeleton, a series of charts, mostly histological, about a hundred and fifty histological slides, and a number of wet preparations of lower animals. Compound and simple microscopes, microtomes, and the usual accessories for histological work are also available.

Zoölogy.

Zoölogy is taught in nine courses: Three terms of major work, variously combined to form three courses, primarily for students in the school of natural science; a term of embryology for those who have taken one of the preceding courses; three courses in entomology amounting to two years' work; a year's work in comparative anatomy, zoölogical œcology, or systematic zoölogy (including palæontology), for advanced students only; and a year's work in independent investigation (senior) for those who select a zoölogical subject for the graduating thesis. Only the first term's work is necessarily common to all students

in the college who desire to make zoölogical study a prominent feature of their course. At the end of this term three divergent lines are open, one leading mainly towards entomology, a second towards physiology and medical study, and a third towards advanced zoölogy—anatomical, systematic, or œcological.

In this department two additional courses are given as elementary and general biology, respectively: The first, open unconditionally to all University students; and the second, an advanced course following upon the preceding, or upon major work in zoölogy and botany.

EQUIPMENT.

The equipment of the zoölogical department is contained in four student's laboratories, an instructor's laboratory, a lecture room, a private office, a store room, and a dark room for photography. It includes twenty aquaria, forty-eight compound microscopes of the best makes (Zeiss, Reicherts, Leitz, and Bausch & Lomb), Zeiss dissecting microscopes, Abbé camera lucidas, microtomes of five patterns (Zimmermann's Minot, Cambridge, Beck-Schanze, Bausch & Lomb, and Ryder), and the usual equipment of incubators, paraffine baths, etc. A set of Blaschka glass models of invertebrates, a set of Ziegler's wax models of embryology, two hundred and fifty wall charts, and some hundreds of permanent preparations in alcohol, are examples of the equipment for the illustration of lectures. Advanced and graduate students have the privilege of the free use of the library and equipment of the State Laboratory of Natural History, which occupies rooms in Natural History Hall. They are thus afforded ample opportunity for prolonged original work in several departments of zoölogical science, especially in those relating to the zoölogy of Illinois. The Bulletin of the State Laboratory is open to graduates for the publication of their papers.

Entomological students have similar access to the collections and resources of the State Entomologist's office, including a well equipped insectary for experimental investigation.

THE PHILOSOPHICAL GROUP.

The philosophical group includes those sciences which deal both with man as an individual, in the mental and moral spheres, especially as these are connected with his physical being, and also with man in society. The branches of knowledge included

in the group occupy a place among the divisions of biological science, and it is intended to carry the spirit of biology, in the commonly accepted sense, into the investigation of these subjects. The general aim and scope of the group is the study of the character and development of the individual and of society, of the relations of man to external nature, of the influence of natural selection on social development, and, finally, of the possible effect of artificial selection on that development, through both subjective and objective influences. In method of treatment, while not neglecting the literary value of the subjects, an effort is made to arouse the scientific spirit, and to keep in close touch with the other work in the college.

Under this caption the subjects of psychology, pedagogy, economics, and philosophy are offered in the College of Science as electives to all chemical and natural science students, and to all students who desire to specialize in the philosophical subjects, with studies in the physical and natural sciences as a preparation for them. All the studies of this group are junior and senior subjects, open, as a rule, to those students only who have done two years of University work.

Classification of Subjects.

PRESCRIBED.

The same as either the natural science or chemical group, pp. 61 and 75.

ELECTIVE.

List A (Major Courses).

Economics (1 to 8), 2 to 11 credits.
Pedagogy (1 to 7), $\frac{2}{3}$ to $9\frac{1}{3}$ credits.
Philosophy (1 to 7), 1 to 6 credits.
Psychology (1 to 9), 1 to 9 credits.

List B (Minor Courses).

Economics (1), 2 credits.
Philosophy (1), 1 credit.
Psychology (1), 1 credit.

List C.

The same as in the natural science group, with the omission of philosophical subjects, p. 76.

Requirements for Graduation.

To graduate from the College of Science in the studies of this group, the student must either complete the subjects of the required list* in the chemical group, or must carry those of the corresponding list* in the natural science group, and earn six full credits additional for major natural science studies. He must further do twelve terms' major work, or their equivalent, on subjects in the philosophical group; must take minor courses in all the philosophical subjects (except pedagogy) in which he has not completed a major course; and must prepare and present a satisfactory thesis on a subject belonging to some department of the philosophical group of studies in which he has done at least five full terms of major work.

DESCRIPTION OF DEPARTMENTS.

Economics.

The instruction in this subject is based on the work of the first two years in science. The relation of the study to the biological sciences commonly so called is emphasized and kept steadily in view. In the general courses the aim is to study society as an organism, to trace its evolution from primitive forms to its present complex structure, to examine the nature of its environment and its adaptation thereto, its present normal character and operations, and the forces, subjective and objective, which are at work tending to change its structure. The courses on special topics are treated as detailed studies of special organs and functions, their character as such is described, and their relations to one another and to the whole social organism are studied.

The plan of instruction combines recitations, lectures, discussions, and reports by students on assigned topics. The advanced courses are divided into two groups and given in alternate years.

Pedagogy.

For an account of the scope and methods of the department of pedagogy see *Pedagogy*, in the College of Literature and Arts.

*Two years of French may be offered in the philosophical group in place of the five terms of German required.

Philosophy.

The work in this department includes history of philosophy, metaphysics, ethics, and logic. The object of their courses is primarily threefold:

1. To meet the wants of those students who in junior and senior years, desire to specialize more or less in this department.

2. To give those who desire a more general knowledge of these subjects, some familiarity with the sphere of philosophical speculation and with the philosophical method as applied to the principles and pre-suppositions of the various sciences.

3. To show the relation of philosophy to practical life and the value of these studies as means of general culture.

The subjects are taught by lectures, recitations, and the seminary method.

Psychology.

The aim of the work in this department is to furnish the student, largely by means of inductive study, a knowledge of the nature of mind, the laws according to which it develops, and the influence of environment upon this development. In the various courses the laboratory method of instruction is brought into prominent use. By means of appropriate apparatus the sensations are studied experimentally and the conditions under which the various sensations arise are accurately determined. Apparatus is also employed to demonstrate to the class the reciprocal relation that obtains between body and mind and to test and measure memory, attention, association, and other higher psychical forces. Throughout the courses an effort is made to put psychology upon an exact basis as a natural science.

The elementary forces of mentality as exhibited in infant life are carefully studied with a view to determine some of the components of the adult mind. A comparative study of the mental life of animals, the lower as well as the higher forms, is undertaken with a view to throw some light upon the morphology of mind. The mental life of defectives as well as pathological states of mind are discussed in their relation to the normal type. The advanced laboratory work is of a nature to develop a spirit of independent research on the part of the student. The relation of psychology to the physical biological sciences is kept conspicuously in view, so that the student may be assisted in his endeavor to bring the manifestations of mind and matter into a related whole.

COLLEGE OF AGRICULTURE.

FACULTY.

ANDREW S. DRAPER, LL.D., PRESIDENT.
EUGENE DAVENPORT, M.S., DEAN, Animal Husbandry.
THOMAS J. BURRILL, PH.D., Botany and Horticulture.
STEPHEN A. FORBES, PH.D., Zoölogy.
CHARLES W. ROLFE, M.S., Geology.
DONALD MCINTOSH, V.S., Veterinary Science.
ARTHUR W. PALMER, SC.D., Chemistry.
FRANK F. FREDERICK, Art and Design.
SAMUEL W. PARR, M.S , Applied Chemistry.
DANIEL W. SHEA, PH.D., Physics.
DAVID KINLEY, PH D., Economics.
DANIEL H. BRUSH, Capt. 17th Infantry, U.S.A., Military Science.
KATHARINE MERRILL, A.B., English.
WILLIAM O. KROHN, PH.D. Psychology.
HENRY E. SUMMERS, B.S., Physiology.
EDGAR J TOWNSEND, PH.M., Mathematics.
WILLIAM H. VANDERVOORT, M.E., Mechanical Engineering.
EVARTS B. GREENE, PH.D., History.
ARTHUR H. DANIELS, Ph.D., Philosophy.
GEORGE W. PARKER, Wood Working.
HARRY S. GRINDLEY, SC.D., Chemistry.
GEORGE P. CLINTON, M.S., Botany.
T. ARKLE CLARK, B.L., English.
ALICE M. BARBER, M.S., Botany.
HERMAN S PIATT, A.M., French.
FRANK SMITH, A.M., Zoölogy.
GEORGE W. MCCLUER, M.S., Horticulture.
HENRY JONES, Blacksmith.
HARLEY E. REEVES, Military Science.
RALPH P. SMITH, PH.B., German.
PETER MOGENSEN, B.S., Mathematics.
HELEN E. BUTTERFIELD, M.L., English.
EDWARD J. LAKE, Art and Design.
FRED A. SAGER, B.S., Physics.

AIMS AND SCOPE.

The College of Agriculture offers a course especially strong in chemistry, botany, zoölogy, physiology, and bacteriology, and in which both agriculture and horticulture are taught from a scientific basis, always with regard to successful practice. The aim is to discuss and teach the principles that underlie these two great arts.

Besides affording special preparation for a technical pursuit it is hoped that this course will commend itself to all lovers of rural life and its affairs in offering the means of keeping pace with the increasing desire for higher learning and better equipment on the part of American citizens of all classes.

To give scope for individual preferences one full study is made elective after the freshman year. This insures the uninterrupted pursuit of the other two and affords the opportunity to elect by courses, if desired.

METHODS OF INSTRUCTION.

Instruction in the sciences is largely by laboratory work, supplemented by lectures, text books, and reference readings, and laboratory methods are regarded as peculiarly suited to the other subjects of the course, and to the needs of those who pursue them. The effort throughout is to teach technical principles and practices in the light of the most profound truths known to science. The college takes a high position in regard to the standing of the subject and the needs of the students.

Reference readings are almost constantly prescribed in standard volumes and periodicals with which the library is most liberally supplied.

For purposes of illustration liberal use is made of experimental fields, live stock, buildings, and apparatus, as well as of the University grounds and cabinet collections.

EQUIPMENT.

The Agricultural Experiment Station, with a farm of 170 acres and suitable buildings, exhibits field experiments in testing the different varieties, and modes of culture, of field crops, and in the comparison and treatment of soils. It carries on experiments in agriculture, horticulture, dairying, and in feeding animals of different ages and development upon the various kinds of food. In common with similar departments in the sev-

eral agricultural colleges of the country, it attempts to create positive knowledge towards the development of an agricultural science.

The extensive fruit and forest tree plantations give abundant opportunity for studies and illustrations in many horticultural lines, and add greatly to the effectiveness of class room work.

The ornamental grounds which surround the University buildings contain about twenty acres, and are kept in neat and attractive style. These, with all the adjuncts of trees and flowering shrubs, lawns, beds of flowers and foliage plants, walks of different materials and styles of laying out, give illustrations to the class room work in landscape gardening. A greenhouse contains a collection of plants of great value for the classes in floriculture and landscape gardening, besides furnishing students with practice in greenhouse management.

The cabinets contain a series of colored casts of fruits, enlarged models of fruits and flowers: collections of seeds of native and exotic plants, of specimens of native and foreign woods, of beneficial and injurious insects, and of specimens showing their work; numerous dry and alcoholic specimens and preparations: maps, charts, diagrams, drawings, etc.

The College has a supply of compound microscopes and apparatus, and students have opportunity to learn their use and to make practical investigations with them. The herbarium is rich in specimens of useful and noxious plants, including many of the fungus parasites which cause disease to cultivated crops.

COURSE OF STUDY.

For the degree of Bachelor of Science 40 full credits are required, of which 29 are to be obtained by pursuing prescribed studies, and 11 are to be obtained by pursuing elective studies, including the two obtained upon the graduating thesis, the subject of which may be chosen by the student. Three studies each term are required besides Military 1, 2 and Rhetoric 2. It will be noticed that after the first year one study is always left to the election of the student. The electives that are offered should be taken as far as possible at the times suggested in the term scheme. Horticulture 2, 3, 4, and 5 (3 credits) may be substituted for Agriculture 3 (1 credit) and Physiology 1 (2 credits).

Students taking this horticulture may elect a subject in place of Veterinary Science 2, and should select thesis work in horticulture.

PRESCRIBED STUDIES.

Agriculture 1, 2, 3, 4, and 5 or 6, 4 credits.
Art and Design 4, 2 credits.
Astronomy 4, 1 credit.
Botany 1, 2. 4 credits.
Chemistry 1. 3a. 4, 5a, 4 credits.
Horticulture 1. 6. 2 credits.
Mathematics 3, 1 credit.
Military 1 and 2, 2 credits.
Physics 2. 1 credit.
Physiology 1. 2 credits.
Rhetoric 2, 2 credits.
Thesis. subject elective. 2 credits.
Veterinary Science 2. 1 credit.
Zoölogy 3. 8. 3 credits.

ELECTIVE STUDIES.

Agriculture 7, 8, 2 credits.
Anthropology 1, 1 credit.
Architecture 1. 3 credits.
Biology, General. 1. 1 credit.
Botany 3. 4. 5. 5 credits.
Chemistry 5b, 5c, 13. 5 credits.
Economics 1 to 5. 2 to 8 credits.
English 1. 2, 5, 6; 3 or 6 credits.
French 5. 3 credits.
Geology 4, 1. 1 or 2 credits.
German 1 or 5, 2. 6. 3 or 5 or 6 credits.
History 1 to 8, 9 credits.
Horticulture 2, 3, 4, 5, 3 credits.
Materia Medica 1, 3 credits.
Mechanical Engineering 2. 1 credit.
Meteorology 1. ½ credit.
Mineralogy 1. 1 credit.
Philosophy 1, 5. 2 credits.
Physiology 2, 3, 5 credits.
Psychology 1, 3, 6. 2 credits.
Veterinary Science 1. 2. 5 credits.
Zoölogy 4. 5. 4 credits.

Course of Instruction.

The following list shows the term of the year when the various subjects are taught, and the order in years in which they should be pursued. The figures at the left refer to the terms or divisions of the year: those following the names indicate the special part or parts of these subjects to be taken, of which a full description may be found in the general alphabetical list beginning on p. 95.

The subjects in italics are prescribed. All others are elective, and should be taken in the years and terms specified.

FIRST YEAR.

1. *Agriculture* 1 and 2: *Chemistry, General* (Chem. 1): *Drawing* (Art and Design 4): *Horticulture* 1: *Military* 1, 2.

2. *Drawing* (Art and Design 4): *Military* 1, 2: *Qualitative Analysis* (Chem. 3a): *Trigonometry* (Math. 3).

3. *Agriculture* 1 and 2: *Astronomy* 4: *Horticulture* 1: *Military* 2: *Organic Chemistry* (Chem. 4).

SECOND YEAR.

1. *Botany* 1: English 1, 2: French 5: German 1, 5: History 1, 2: *Military* 2: Mineralogy 1: *Quantitative Analysis* (Chem. 5a): Shop Practice (Arch. 1): Veterinary Science 1.

2. *Botany* 1: Chemistry 5b, 13; English 1, 2: French 5: Geology 4: German 1, 5: History 1, 2: *Military* 2: Shop Practice (Arch. 1): Mech. Eng'g 2; Veterinary Science 2; *Zoölogy* 3.

3. *Botany* 1: Chemistry 5c, 13: English 1, 2: *Entomology* (Zoöl. 8); French 5: German 1, 5: History 1, 2: *Military* 2: Shop practice Arch. 1: Veterinary Science 2.

THIRD YEAR.

1. Bacteriology (Bot. 2): Chemistry 5a: Economics 1: English 5, 6; French 5; *Fruit Culture* (Hort. 2), *or Stock Breeding* (Agr. 3); German 1, 5, 2; History 1, 2, 3, 4, 5: Materia Medica 1: Mineralogy 1; Philosophy 1; *Rhetoric* 2; Veterinary Science 1; Zoölogy 3.

2. Agriculture 8; Anthropology 1; Botany 3: Chemistry 5b, 13; Economics 1; Embryology (Zoöl. 4): English 5, 6: French 5: Geology 4: German 1, 5, 2, 6; History 1, 2, 3, 4, 6: *Horticulture* 3 and 4, *or Physiology* 1; Materia Medica 1: Physics 2: *Rhetoric* 2: Veterinary Science 2.

3. Agriculture 7: Biology, General 2: Botany 4: Chemistry 5c, 13: Economics 2, 5: English 5, 6; *Fertility* (Agr. 4) *or Gardens*

(Hort. 5): French 5: German 1, 5, 2, 6: History 1, 2, 3, 4, 7: Materia Medica 1: Philosophy 3: *Physiology* 1: Psychology 1: *Rhetoric* 2: Veterinary Science 2.

FOURTH YEAR.

1. *Bacteriology* (Bot. 2): Economics 1, 3: French 5: Geology 4: German 1, 5, 2: History 1, 2, 3, 4, 5: Meteorology 1: Mineralogy 1: Philosophy 1: Physiology 2: *Plant Propagation* (Hort. 6): Veterinary Science 1, 3: Zoölogy 5.

2. Agriculture 8: Anthropology 1: Botany 3, 5: Economics 1, 3: French 5: Geology 1, 4: German 1, 5, 2, 6: History 1, 2, 3, 4, 6: Materia Medica 1: Physiology 2, 3: Psychology 3, 6: *Thesis; Veterinary Science* 2: Zoölogy 4, 5.

3. Agriculture 7: Biology, General 2: Botany 4, 5: Economics 2, 4, 5: French 5: Geology 1: German 1, 5, 2, 6: History 1, 2, 3, 4, 7: Materia Medica 1: Philosophy 3: Physiology 2, 3: *Stock Feeding or Soils* (Agr. 5 or 6): *Thesis;* Veterinary Science 2: Zoölogy 5.

SPECIAL STUDIES.

The University grants liberal terms to students not candidates for a degree by which they may pursue particular studies for a longer or shorter time, free from some of the conditions of the prescribed course. Special students will be received into classes of this college on the same terms and conditions as to those of the other colleges. See under the heading—ADMISSION.

WINTER SCHOOL IN AGRICULTURE.

For the winter term students are admitted without entrance examination or payment of any fee to a special short course in which there are daily lectures and class exercises concerning some of the most important practical branches of agriculture, horticulture, and veterinary science. This course is designed for young men already engaged in agricultural pursuits who cannot spend a long time in college, and yet are anxious to make the most of themselves and of their vocation. Such students have access to the library and museum collections of the University, and have admission to the courses of general lectures.

The details of this course vary from year to year. A special circular giving full information concerning it is issued each year several weeks before the opening of the winter term.

GENERAL LIST OF SUBJECTS.

This list gives all the subjects and the entire number of courses of instruction offered to students of the University. The several courses are described, and the term or terms when they are taught, are designated.

When in connection with any course, certain other courses are named under the head of *required*, the course is open to those students only who have already passed satisfactorily in the *required* courses.

The arrangement is by alphabetical order of the chief headings, under which the subordinate divisions, if any, are placed.

COURSES OF INSTRUCTION.

AGRICULTURE.

1. CROPS.—Influence of physical conditions—moisture, heat, and light—in determining yield. Methods of controlling these conditions—as culture, drainage and irrigation. Selection and improvement of varieties. Vitality and pedigree of seed. Influence of climate. Fertility and barrenness, with causes, indications, and treatment. Especial attention is bestowed on crops most successfully grown in these latitudes. Lectures and reference reading. *Fall and spring terms, two-fifths study.* Professor DAVENPORT.

2. BREEDS OF STOCK.—Their development, history, and adaptations to particular purposes. Critical study is made of animal form as an index of excellence, and practice is given in examination of specimens and in methods of judging. Lectures, reference reading, and practice. *Fall term, one-fifth study.* Professor DAVENPORT.

3. STOCK BREEDING.—Variation, its extent and importance, both in nature and under domestication. How far inherent and how far induced by environment. Acquired characters and their inheritance. Correlated variation. Selection. Survival of the fittest. How to fix favorable variations. Effects of use and disuse. Intercrossing, first as stimulating, afterward

as eliminating variations. Hybridism. Grading and its benefits. Breeding in line and inbreeding. Instinct and intelligence. The aim is to bring every known principle of reproduction to the assistance of the breeder's art. Lectures and reference reading. *Full term, full study.* Professor DAVENPORT.

Required. Botany 1; first term Zoölogy 3.

4. FERTILITY.—Mutual reactions between fertilizer, crop, and soil. Effect of fertilizer on amount, character, and composition of crop. Residues or the fate of fertilizers, as determined by examination of the soil and its drainage water: effect of particular crops upon fertility and upon each other, whether growing in succession or together. Nitrification and leguminous crops. Economic sources of the elements of fertility, and their tendency to accumulate in the soil or to disappear in the drainage water. The knowledge thus obtained is made the basis for a rational study of fertilizers and their use, of rotations and of specialties, of extensive and of intensive methods, that the residue of one crop may be saved by the succeeding one and not washed away. *Spring term, full study.* Professor DAVENPORT.

Required. Botany 1: Chemistry 1, 3a, 4.

5. STOCK FEEDING.—Functional activities of the animal body and the end products of their metabolism. Foods are considered, first chemically, as affording the materials for these activities whether in construction of body tissues or of animal products, as meat, milk, etc.; second dynamically, as supplying the potential energy for these processes, and for labor, speed, etc. Preparation of foods, their palatableness, and digestibility. This knowledge is used as a basis for calculating how the feeding practices of any locality may be adjusted to the consumption of the crops most successfully grown in that region, that domestic animals may become and remain, essentially, consumers of coarse crops and by-products. Optional, alternating with Agriculture 6. *Spring term, full study.* Professor DAVENPORT.

Required. Botany 2: Physics 2: Physiology 1: Zoölogy 3.

6. SOILS.—Further study of soil conditions and properties, physical, chemical, and physiological. Cumulative effect upon soils of certain fertilizers and crops. Critical study of drainage and of drainage waters as compared with fertilizers applied, herbage produced, and rain-water fallen. Influence of crops

and fertilizers upon the accumulation of nitrogen within the soil. Further study upon the fixation of free nitrogen and the agency of bacteria. Optional, alternating with Agriculture 5. *Spring term, full study.* Professor DAVENPORT.

Required. Botany 1; Chem. 1, 3a, 4: Zoölogy 3, or Botany 2.

7. COMPARATIVE AGRICULTURE.—Influence of locality, climate, soil, race, customs, laws, religion, etc., upon the agriculture of a country and incidentally upon its people. One crop only and its effect, as rice, Indian corn in American agriculture and affairs. Varying conditions under which the same crop may be produced, as wheat. Statistical agriculture. Influence of machinery, and of land titles whether resting in the government, in landlord, or in occupant. Relation of agriculture to other industries and to the body politic. The agriculture of the world. *Spring term, full study.* Professor DAVENPORT.

8. AGRICULTURAL EXPERIMENTATION.—A systematic study of the work of Experiment Stations and experimenters in this and other countries, together with a critical study of correct principles and methods of experimentation. Especially designed for such students as desire to fit themselves for work in original investigation in Experiment Stations or elsewhere. *Winter term, full study.* Professor DAVENPORT.

ANTHROPOLOGY.

1. This course in general anthropology begins with a study of the physical and psychical elements of ethnography. Theories as to the origin of man are discussed and the various races of mankind are distinguished and described. Special attention is given to the historical and comparative study of customs, ceremonies and rites, beliefs, and folk-lore of primitive peoples with reference to the common characteristics and fundamental instincts of mankind and to the origin and growth of existing customs and social institutions. *Lectures and prescribed reading. Winter term, full study.* Dr. DANIELS.

Required: A major or minor course in Economics, Geology, Psychology, or Zoölogy.

ARCHITECTURE.

1. SHOP PRACTICE.—To give a practical knowledge of various kinds of work, three terms are devoted to a course of in-

struction which all architectural students are required to pursue, unless they have previously had equivalent practice and obtained credit therefor.

First Term.—Carpentry and Joinery. Planing flat, square, and octagonal prisms and cylinders; framing with single, double, and oblique tenons; splices straight and scarfed; miter, lap, and gained joints; through and lap dovetails; moldings, miters, miter-box, and panels.

Second Term.—Turning and Cabinet Making. Glue joints; moldings; inlaying; ornamental veneering; turning cylinders, balusters, ornamental forms, capitals, rosettes, vases, etc.

Third Term.—Construction of portions of buildings or of complete architectural structures at a reduced scale; roof trusses, stairs, frames of wooden buildings, etc., made from drawing. *Fall, winter, and spring terms, full study.* Mr. PARKER.

2. WOOD CONSTRUCTION.—Formulæ and data for computing the dimensions and strengths of columns, rods, beams, girders, etc., of wood or metal are first given and then applied in the solution of numerous examples. The kinds of wood and their uses in construction and decoration, their seasoning, shrinkage, defects, and modes of protection from decay, are next studied. The construction and design of wooden floors, walls, ceilings, and roofs are then treated, and afterwards joinery, comprising doors, windows, bays, inside finish, cornices, wainscoting, etc. The construction and design of stairs of the various types terminate the work of the term. About twenty problems are worked out on as many plates by the student. *Ricker's Wood, Stone, Brick, and Metal Construction; Macfarlane's Elementary Mathematical Tables. Fall term, full study.* Assistant Professor WHITE.

3. STONE, BRICK, AND METAL CONSTRUCTION.—Foundations of stone, brick, concrete, and on piles, are first studied. Then the materials employed in stone masonry, their uses, defects, qualities, and mode of preparation. Kinds of masonry and external finish. Tools and methods of stone cutting. The preparation of working drawings is illustrated by practical applications in the study of the arch, the vault, and the dome. Brick masonry is next examined, with its materials and bonds, and several examples are drawn. The manufacture and refining of cast-iron, and wrought-iron and steel are then studied, together with the processes of pattern making, molding, casting, refining, rolling, etc., as well as the stock or standard dimensions or sections to

be obtained in the market. The special properties and value of each metal in a structure, the designing of a line of columns in a tall mercantile building, and of beams and girders, together with the study of joints and connections completes the work of the term. About twelve problems are drawn on the same number of plates. Same text books as in fall term. *Winter term, full study.* Assistant Professor WHITE.

Required: Arch. 1; General Engineering Drawing 1, 2, 3, 4.

4. SANITARY CONSTRUCTION.—Daily recitations or special lectures, with designs for special problems. The study of plumbing, trap ventilation, removal of wastes, construction of water closets, drains, and systems of water supply; sewage disposal. Hot water supply and fixtures in dwellings. *Gerhard's Drainage and Sewerage of Dwellings; Lectures on Sewage Disposal. Spring term, full study.* Assistant Professor WHITE.

Required: Arch. 1; Math. 4; Physics 1, 3.

5. ROOFS.—This term is devoted to the elements of graphic statics, and to the applications of the science in the designing of trussed roofs. The composition and resolution of forces, equilibrium, reactions, moments, bending moments, and shears on beams, center of gravity and moment of inertia of any form of cross section, are first examined. The construction of wooden and of metallic roofs is next studied, then the mode of computing permanent and temporary loads on roof trusses, of obtaining end reactions, of drawing strain diagrams, determining sectional dimensions of members, and ending with the designing of joint connections. Numerous problems are solved, five different types of trusses are usually worked out, complete designs and details being made for one of wood and another of iron or steel. *Ricker's Trussed Roofs. Ricker's Notes on Graphic Statics. Spring term, full study.* Assistant Professor WHITE.

Required: Math. 2, 4, 6, 7, 8, 9; Theoretical and Applied Mechanics, 1, 2, or 4, 5; Architecture 2, 3, 4 (except for students in civil, municipal, and mining engineering courses).

6. HISTORY OF ARCHITECTURE.—Two terms' work, usually divided at the beginning of the Romanesque style. Commencing with the Egyptian and ending with the modern styles, a careful study is made of each of the more important styles, successively examining the historical conditions, the local and inherited influences, the structural materials and system, the special ornaments, and the purposes and designs of the buildings, with

an examination of a few of the most important typical examples of the styles. Especial attention is given to any ideas that might be useful or suggestive in American work, and to tracing the gradual evolution of architectural forms. This study therefore becomes a very interesting branch of the history of human civilization. References are made to numerous works, especially to Fergusson, Lubke, Durm, Reber, Gailhabaud, etc. *Ricker's Notes on History of Architecture. Fall and winter terms, full study.* Professor RICKER.

Required: Architecture 2, 3, 4.

7. HISTORY OF ARCHITECTURE (Details).—Exercises in drawing at large scale the most important details of the Grecian, Roman, Early Christian, Byzantine, Mohammedan, Romanesque, Gothic, and Renaissance styles. *Notes and Sketches. Spring term, full study.* Professor RICKER and Mr. GUNN.

Required: Architecture 2, 3, 4, 6, 8, 9, 11, 20.

8. ARCHITECTURAL DRAWING (The Orders).—A study of the five orders of architecture in general and in detail, with application to problems in design. A careful study is first made of the proportions and details of the orders, with recitations and black-board sketching. Competitive problems in design involving the use of the orders are then given, the time for each problem being limited and each competition decided by architects or draughtsmen of experience outside of the University. *Vignola's Five Orders, Boston edition, with translation. Winter term, full study.* Mr. GUNN.

Required: General Engineering Drawing 1, 2, 3, 4; Architecture 2, 3.

9. ARCHITECTURAL DRAWING (Methods, Shades, and Shadows).—The subjects of instruction on the different methods of finishing architectural drawings in line and washes, and the study of shades and shadows, these being so combined as to produce the greatest benefit to the student. The academic method of finishing drawings with ink or color wash, with shades and shadows due to direct and reflected light, is taught, the single plane method being preferred for this purpose, being applicable to most cases. The subjects for the plates are taken from *Vignola's Five Orders*, as a preparation for work of the winter term in orders. Some work is done involving the use of color. *Notes and References on Shades and Shadows. Fall term, full study.* Mr. GUNN.

Required: General Engineering Drawing 1, 2, 3, 4; Architecture 2, 3.

10. Architectural Drawing (Office Work)—This term is devoted to instruction in the office style of preparing working drawings for a given building. Rough figured sketches are furnished to the student, from which each student makes a set of general and detailed drawings in pencil on opaque paper. These are then traced in ink on transparent paper or linen and colored to indicate materials. Especial care is taken to secure neat lettering and accurately figured dimensions. Personal instruction to each member of the class. *Spring term, full study.* Mr. Gunn.

Required: General Engineering Drawing 1, 2, 3, 4; Architecture 2, 3, 4.

11. Architectural Seminary.—Reports and discussions of original investigations of assigned topics, especially in the History of Architecture; reviews of books, abstracts of current technical journals and other publications. *One session weekly during junior year.* Professor Ricker.

The seminary equipment will also be used by seniors in the preparation of theses, and by graduates for advanced work.

12. Superintendence, Estimates, and Specifications.—This study comprises several specialties in office work, not otherwise provided for, so far as they can be taught in a professional school. One-third the time is devoted to superintendence, one-half to estimates, and the remainder to specifications, contracts, etc.

Clarke's Building Superintendence is carefully read with daily recitations. *Clarke's Architect, Owner, and Builder before the Law.*

In estimates the purpose of the instruction is to impart a knowledge of the usual methods of measurement of materials and work, the arrangement of computations in proper and convenient order, and an acquaintance with approximate prices of materials and labor, which vary in different localities. The methods of squaring, of cubing, of units, and of quantities, are each employed and illustrated by numerous examples.

In specifications, practice is obtained by writing out a complete set for a house, drawings for which have been previously made by the student.

Dietzgen's Specification Blanks are employed. The standard *Contract of the American Institute of Architects* is used, being first carefully studied, then filled out for the same house. Bids, certificates, and other papers are made out. *Ricker's Lectures on Estimates. Fall term, full study.* Assistant Professor White.

Required: Architecture 2, 3, 4, 5, 6, 10; Theoretical and Applied Mechanics 1, 2, or 4, 5.

13. Heating and Ventilation.—A full knowledge of the scientific theory and of the practice of warming and ventilating buildings is the purpose of this study. Commencing with the fuels and the production of heat, the student passes to the flow of gases through ajutages and pipes, applying these data to the calculation of the dimensions of air ducts and chimneys. The different systems of heating by furnaces, hot water, steam, etc., are next examined, with the details of each. The sources of impurity in the air and the requirements of good ventilation are then considered, with the different methods of ventilation by aspiration, by fans, etc., ending with the study of fans of different types. Numerous problems are given. *Ricker's Notes on Heating and Ventilation. Full term, full study.* Professor Ricker.

Required: Mathematics 2, 4, 6: Architecture 2, 3, 4, 10: Physics 1, 3; Chemistry 1: Theoretical and Applied Mechanics 1, 2, or 4, 5.

14. Architectural Perspective.—The theory of perspective is taught, with all labor saving methods of abbreviating the labor, and designing in perspective itself is made a special aim, this power being very useful to a draughtsman in preparing sketches for clients. Methods of diagonals by triangles, and by coördinates are all used. Problems in angular, parallel, vertical, and curvilinear perspective, as well as in perspective shades and shadows, are solved, requiring original work as far as possible, so as thoroughly to prepare the student for any kind of work in perspective, instead of restricting him to the study and use of a single system. Six problems are worked out on as many plates. *Ware's Modern Perspective. Fall term, full study.* Assistant Professor White and Mr. Gunn.

Required: General Engineering Drawing 1, 2, 3; Architecture 2, 3, 4, 8, 9, 10, 20.

15. Requirements and Planning of Buildings.—A study of the varied requirements of buildings erected for the more important purposes, with exercises in making sketch plans for selected programs. Block plans, grouping of parts, light courts, communications, economical and durable construction, approximate cost and rentals, etc. *Lectures, with illustrations and references to architectural library and cabinet. Winter term, full study.* Professor Ricker.

Required: Architecture 2, 3, 4, 5, 6, 7, 8, 9, 10, 11, 13.

16. Architectural Designing. (Residences).—Practice in design and the study of the requirements of dwellings of moderate size are the objects of the study. Several typical plans are selected as bases, and numerous changes suggested, which usually produce radical changes in the design. The student is also encouraged to make working drawings for actual clients, criticisms and suggestions being freely made to him. The work is limited to residences, since this class of buildings is likely to afford the graduate his first opportunity for independent original work, and practice in satisfying their requirements is considered to be more valuable than the study of theoretical or impossible problems. The designing of a convenient, attractive dwelling, to cost a limited amount, is really a very difficult problem, requiring more time and thought than any other building of equal cost. *Gibson's Convenient Homes. Scribner's Homes in City and Country. Winter term, full study.* Assistant Professor White.

Required: Architecture 2, 3, 4, 6, 7, 8, 9, 10, 12, 13, 20.

17. Architectural Designing. (Problems).—Since students often find considerable difficulty when commencing to express their ideas in designs, several simple problems are first given, such as a tower, a store with flats over it, a small library, etc., five being studied usually during the term. Each student makes sketches at small scale, which are criticised and modified until approved, then worked out in plans, elevations, and details, one elevation being washed to show color or shade effects. The object is to obtain as much practice in original design as possible; and in the making of rapid and effective sketches, suitable for submission to a client or employer. *Spring term, full study.* Assistant Professor White.

Required: Architecture 2, 3, 4, 6, 7, 8, 9, 10, 12, 13, 20.

18. Esthetics of Architecture.—The laws of correct design, so far as these may be formulated in words, illustrated by the study of numerous examples. Commences with the study of the nature and mode of working of the different materials used in structural and ornamental purposes, deducing the proper ornamental treatment for each, then taking up the proper decoration of walls, ceilings, and roofs. The general principles of ornamentation are next stated, as applied to flat surfaces and to solids of various shapes. A full study of the various materials used in furniture, art works, etc., is then made, with suggestions of their proper use in the art industries. About twenty

problems in original design are worked out on as many plates. *Ricker's (abridged) Translation of Redtenbacher's Architiktonik; Meyer's Handbook of Ornament. Spring term, full study.* Professor RICKER.

Required: Architecture 2, 3, 4, 6, 7, 8, 9, 10, 11, 12, 13, 14, 16, 20.

19. ADVANCED GRAPHICS. — This continues the study of graphic statics, commenced in roofs, with applications to metallic roofs of wide spans, roof trusses of curved or arched form, and those supported by abutments and also jointed. Spherical and conical trussed domes. Continuous girders are also examined, with the effect of moving loads on girders, the instruction ending with the graphical analysis of the arch, vault, and dome, and of the Gothic system of vault and buttress. Practical applications are made to a series of problems in design for specified cases. *Ricker's Notes on Advanced Graphics.* References to the works of Planat, Landsberg, DuBois, Clarke, Ott, Levy, Muller Breslau, etc., on Graphic Statics. *Winter term, full study.* Professor RICKER.

Required: Math. 2, 4, 6; Theoretical and Applied Mechanics 1 and 2, or 4 and 5; Architecture 2, 4, 5.

20. ARCHITECTS' ART COURSE 1, *Prescribed.*

First term. Lectures on free hand perspective and practice in drawing geometric solids. Principles applied by drawing groups of common objects, as books, vases, chairs, tables, etc.; casts of architectural ornament; interiors, as the corner of the room. Special attention is given the work from casts and interiors. *Frederick's Notes on Free Hand Drawing.*

Second term. Study of chiaroscuro in charcoal, pencil, ink, and water color (monochrome) from groups of still-life and architectural ornament. Instruction in preparing working drawings of ornament.

Third term. Rendering perspectives in washes of water color. Sketching from nature. *Frederick's Architectural Rendering in Sepia.* Lectures on Historic Ornament, Perspective, etc., during the year, same as Art and Design 1.

A course in Architectural Rendering in Pen and Ink is offered in the fall term, open to those who can satisfactorily pass an examination in the regular work of the term. Weekly criticisms of pen work executed out of hours are given throughout the year. *Fall, winter, and spring terms, full study.* Professor FREDERICK.

Required: General Engineering Drawing 1.

21. Architect's Art Course 2, *Optional.*

First term. Modeling in clay details of human face; copy of cast of ornament; architectural ornament from photograph. Casts are made of one of the above and of one original design.

Second term. Study of color as a means of interior and exterior decoration, at least one color scheme to be worked out, full size, in tempera colors.

Third term. Work in water colors, groups and perspectives, or sketching from the antique. Sketching from nature in color. One day each week throughout the year is devoted to architectural rendering in pen and ink. *Fall, winter, and spring terms; full study.* Professor Frederick.

Required: Architecture 20.

ART AND DESIGN.

1. For special students of Art and Design.

First year, first term. Lectures on free hand perspective and practice in drawing geometric solids. Principles applied by drawing groups of common objects, as books, vases, chairs, tables, etc., casts of ornament; interiors, as the corner of the room; plants and flowers from nature.

Frederick's Notes on Free Hand Drawing.

Second term. Study of chiaroscuro in charcoal, crayon, ink, pencil, and water color (monochrome) of geometric solids, still-life, casts, etc.

Third term. Study of anatomy, using Duval's Artistic Anatomy as text-book, and drawing from Rimmer's Art Anatomy and Julien's Etudes D'Aprés l'Antique. Also outline drawing from the antique figure, and shaded drawings in charcoal of details of the human figure and animal forms.

During the year lectures are given on lettering, design, historic ornament, perspective and the theory of color. Students are required to submit one or more plates in each subject.

Second year, first term. Modeling in clay (*a*) details of human face, (*b*) copy of cast of ornament, (*c*) ornament from photograph. Casts are made of (*a*) at least one modeled piece, (*b*) arm, hand or foot from nature, (*c*) foliage, fruit, or vegetable from nature.

Second term. Painting in oil color: (*a*) study in monochrome from still-life; (*b*) group, as a study for composition and color.

Third term. Painting in water color: (*a*) group, as a study for composition and color: (*b*) sketching from nature.

Third year, first term. Modeling: (*a*) bas relief from antique figure, (*b*) anatomical rendering of an antique figure, (*c*) bust from the antique, (*d*) portrait head from nature in the round or relief. Casting: (*a*) piece mould, (*b*) sulphur mould, (*c*) gelatine mould.

This term may be devoted to the study of pen and ink illustrating if preferred. A costumed model will pose one day each week.

Second term. Oil painting. Half the time may be devoted to the work of the second term of the third year of course 2.

Third term. (*a*) Shaded study of antique figure. (*b*) Portrait head from nature. (*c*) Sketching from nature in color.

Fourth year, first term. (*a*) Advanced work in modeling. (*b*) Design introducing the human figure.

Second and third terms. (*a*) Advanced work in oil and water-color painting. (*b*) Design for interior decoration introducing the human figure. *Four years, double study.* Professor FREDERICK.

2. FOR STUDENTS OF DESIGN.—First term. Study of the relation of design to manufacture.

Second term. Study of color as a means of interior and exterior decoration. At least one color scheme to be worked out, full size, in tempera colors.

Third term. Practice in designing in the line of work of which the student wishes to make specialty. *One year, double study.* Professor FREDERICK.

Required: Art and Design, 1, first two years.

3. For special courses arranged for students of architecture, see Architecture 20 and 21, pages 104, 105.

4 FOR STUDENTS IN COLLEGE OF AGRICULTURE AND SCHOOL OF NATURAL SCIENCE.—First term, same as in course 1. Second term, same as in course 1, except that special attention is given to drawing plant and animal forms from nature. Third term, use of pen and ink and water color in work relating to these courses.

Lectures, same as in course 1. *One year, full study.* Professor FREDERICK.

5. FOR STUDENTS OF MECHANICAL, ELECTRICAL, AND CIVIL ENGINEERING AND OF CHEMISTRY.—First term, same as in

course 1. Second term, same as in course 1, except that special attention is given to drawing details of machinery and chemical apparatus. *Fall and winter terms, full study.* Professor FREDERICK.

6. For students in College of Literature and Arts.—The work in this course is the same as course 1, as far as time will allow. *One or two years, full study.* Professor FREDERICK.

7. Course in the History of Art.—Lectures with collateral reading. Selections from Ruskin, Sir Joshua Reynolds, Viollet le Duc, Day's Work on Ornament, Penot and Chipiez' and Reber's histories of art, and other works relating to the history and methods of painting, sculpture, and architecture.

These lectures are illustrated by several hundred lantern slides, and are open to all students of the department. *One year, once a week.* Professor FREDERICK.

ASTRONOMY.

1. CELESTIAL MECHANICS.—This course will include a study in detail of some of the principles and laws of analytical mechanics as applied to the solution of astronomical problems. More specifically, it will consider the following and other similar subjects: motion of a particle in space under the action of central forces: determination of paths when the laws of force are given: determination of orbits, masses, etc., of the heavenly bodies. So far as is possible all computations are based upon data taken by the student. *Watson's Theoretical Astronomy. Winter term, full study.* Assistant Professor MYERS.

Required: Theoretical and Applied Mechanics 1.

2. DESCRIPTIVE ASTRONOMY.—For students of the College of Engineering. This course comprises the subject matter of course 1, and, in addition, some of the fundamental principles of celestial mechanics. Astronomy is here taught with a view to its utility rather than as a matter of general information. Students are required to work out problems in latitude and longitude, to deduce from the principles of mechanics formulæ for weighing the masses of the heavenly bodies against one another, to solve problems involving corrections for parallax, refraction, dip of the horizon, and to determine mathematically the distances, dimensions, and orbits of the bodies of the solar system. When weather permits, the equatorial telescope is in use by students, and time is spent in the location and study of the con-

stellations. Frequent readings are assigned on astronomical subjects of value to be found in astronomical publications in the library. Though no attempt is made to teach practical astronomy, which is taught as a specialty in civil engineering, the practical features of descriptive astronomy are kept uppermost in this course. *Young's General Astronomy. Spring term, full study.* Assistant Professor MYERS.

Required: Math. 4; Physics 1, 3; Theoretical and Applied Mechanics 1.

3. MATHEMATICAL ASTRONOMY.—This course will be a continuation of the work begun in Celestial Mechanics. Considerable time must be spent in the work of the observatory. Fuller consideration will be given to these topics: the doctrine of the sphere; motions of the heavenly bodies; instrumental adjustments and methods; and various other mathematical practical features of the subject. The aim will be to familiarize the student with the practice and the problems of the working observatory. *Watson's Theoretical Astronomy; Chauvenet's Practical Astronomy; Price's Analytica l Mechanics. Fall term, 2 hours per week, winter and spring terms, 3 hours per week. This with Mathematics 16 and 17 constitutes a full study for each term.* Assistant Professor MYERS.

Required: Astronomy 1.

4. DESCRIPTIVE ASTRONOMY.—For students in Colleges of Agriculture, Science, Literature, and Arts. The aim of this course is to supply (1) a general knowledge of the facts of astronomy, (2) a clear conception of the principles underlying them, and (3) an understanding of the methods of arriving at these facts. The subjects considered are the doctrine of the sphere, the heavenly bodies, their nature, dimensions, characteristics, and the influence they exert upon one another by their attractions, radiation, or any other ascertainable cause. The most important instruments of astronomical research are explained, and during favorable weather, the sun, moon, and planets will be studied with the equatorial telescope. Methods of spectroscopic research are discussed and, as far as possible, illustrated. Illustrative charts and lectures are also occasionally resorted to. *Newcomb and Holden's Astronomy, Advanced Course. Spring term, full study.* Assistant Professor MYERS.

Required: Math. 3.

BACTERIOLOGY.

See Botany 2, p. 110.

BIOLOGY, GENERAL.

1. ELEMENTARY BIOLOGY.—This is a laboratory and lecture course on the morphology, physiology, and œcology of types, selected chiefly from the animal kingdom. The work is so directed as to lead to an acquaintance with the simpler generalizations of biology, in preparation for the more extensive and thoroughgoing theoretical work of the following course. *Winter term, full study.* Mr. SMITH.

2. ADVANCED GENERAL BIOLOGY.—For those who have taken general biology 1 or a year's work in either botany or zoölogy, a single term of advanced general biology is arranged and especially commended. It is intended to review, extend, systematize, and unify the student's knowledge of the phenomena, the history and the laws of life, and of the relations of plant and animal, of living and not living matter, and of biology to the other sciences. It will be taught chiefly as a seminary subject, with occasional lectures and some study of text. It is primarily a junior or senior study. *Spring term, full study.* Professor FORBES.

Required: General Biology 1, or a major course in Botany or Zoölogy.

BOTANY.

1. HISTOLOGY, MORPHOLOGY, AND PHYSIOLOGY.—This course extends through one year, beginning in the fall. At first systematic studies are made upon specially difficult natural orders of flowering plants, as Compositæ, Cyperaceæ, and Gramineæ, with attention given to nomenclature and to the principles of classification. After vegetation has been destroyed by frost the remainder of the fall term is devoted to the histology of plants. Students make and study microscopical sections and other preparations, make micro-chemical tests, draw figures, and write descriptive notes. Lectures or text-book recitations occur about twice a week.

The morphology and classification of special groups of plants, beginning with the lowest orders, constitute the work of the winter term. Compound microscopes are constantly in use, and the laboratory work is made the basis of instruction, variously aided and extended by the study of the text-book and by lectures. Special attention is given to injurious fungi.

The third term is devoted to vegetable physiology, and includes: the extent and causes of the movements of fluids in the tissues; the absorption of nutrient materials, respiration, transpiration, and assimilation; the causes, peculiarities, and results of growth; the relations and effects of external agencies, as heat, light, gravitation: self- and cross-fertilization; variation and heredity; movements and sensitiveness. The instruction is given by lectures and recitations, supplemented by required observations and laboratory practice. *Bessey's Botany; Darwin and Acton's Practical Physiology of Plants; Vine's Lectures on Vegetable Physiology. Fall, winter, and spring terms, full study.* Professor BURRILL and Miss BARBER.

Required: Chemistry 1; Art and Design 4.

2. BACTERIOLOGY.—Bacteria and allied organisms are now known to play exceedingly important roles in nature, and in the daily life and well-being of man. This course is an introduction to existing knowledge upon the subject, and offers instruction in the modern methods of experimentation and research. The laboratory is well equipped for a limited number of students. Only those who can give extra time, when occasion demands, should undertake the work. Lectures and assigned reading accompany the laboratory work. *Fall term, full study.* Professor BURRILL.

Required: Botany 1 or 6; Chemistry 1.

3. SYSTEMATIC BOTANY.—There is offered in this course an opportunity for advanced work in special groups of cryptogamic plants, to which an introduction is made in the winter term of course 1. The determination and classification of species and studies upon life histories largely occupy the time. The methods of bacteriology are used in the cultivation of fresh material. Students who propose to take the course should give notice of the fact at the beginning of the year or earlier, and should make collections for themselves. Laboratory work constitutes the principal part of the course. *Winter term, full study.* Professor BURRILL.

Required: Botany 1, 2.

4. PLANT REPRODUCTION AND DEVELOPEMENT.—Studies are made upon self- and cross-fertilization, embryology, and development, and upon special topics in physiology. Laboratory work, supplemented by lectures and assigned reading. *Strasburger's*

Practical Botany; Detmer's Pflanzenphysiologisches Prakticum. Spring term, full study. Professor BURRILL.

Required: Botany 1.

5. INVESTIGATION AND THESIS.—Facilities are offered for original investigations upon selected subjects upon which may be based a thesis required for a degree. Special arrangements should be made with the instructor during the preceding year, or at least not later than the beginning of the year in which the work is to be taken. *Fall, winter, and spring terms, full study.* Professor BURRILL.

Required: Botany 1; Chemistry 1; Art and Design 4.

6. GENERAL BOTANY.—This minor course is offered to students who have but a single term of botanical study. An endeavor is made to present a general view of the science and to provide an introduction to modern methods of work. Lectures or recitations, but mostly laboratory and field work. *Spring term, full study.* Miss BARBER.

7. PHARMACEUTICAL BOTANY.—The microscopical examination of vegetable drugs and their adulterations. Microscopy, including the structure and use of the compound microscope, and the preparation of objects. Use of drawing and photographic apparatus. *Winter term, two-fifths study; spring term, three-fifths study.* Professor BURRILL and Miss BARBER.

Required: Botany 1a.

CHEMISTRY.

1. ELEMENTARY AND EXPERIMENTAL CHEMISTRY. — This course, which is designed for those who desire an elementary knowledge of chemistry, deals only with the fundamental, general principles of the science, the few typical elements and compounds which are studied, being considered largely for the purpose of illustration.

The instruction includes lecture-demonstrations, recitations, and laboratory exercises. The laboratory work comprises a series of such experiments as serve best to illustrate the relations between the observed facts and the general principles, and to familiarize the student with the methods of chemistry. *Remsen's Introduction to Chemistry. Fall term, full study.* Professor PALMER and Dr. GRINDLEY.

2. DESCRIPTIVE INORGANIC CHEMISTRY.—This course is required of all chemical students. It is mainly devoted to a study

of the metallic elements, their classification, compounds, and chemical properties. The work is from lectures and assigned text (no laboratory work). *Remsen's Advanced Course. Winter and spring terms, three-fifths study.* Dr. GRINDLEY.

Required: Chemistry 1.

3a. QUALITATIVE ANALYSIS.—This course includes a study of salts, their formation, solubilities, chemical reactions, etc. The periodic classification of the elements is made the basis for developing the principles of analysis. The work in the laboratory, after illustrating those principles, is occupied with the determination of base and acid constituents of a given number of unknown substances. *Winter term, laboratory work 2 hours daily, and lectures 3 hours per week, full study.* Professor PARR.

Required: Chemistry 1.

3b. QUALITATIVE ANALYSIS, continued with more complex Substances.—A comparative study of methods, difficult separations, problems in synthesis, etc. *Spring term, laboratory work 3 hours daily, full study.* Professor PARR.

Required: Chemistry 1, 2.

4. ELEMENTS OF ORGANIC CHEMISTRY.—A course in organic chemistry, provided more especially for students who are not making a specialty of chemistry. The instruction is directed mainly to the consideration of the general characteristics and the mutual relations of some of the most important classes of carbon compounds, and the course constitutes a general introduction to the principles and the methods of organic chemistry. In the laboratory a few typical substances are prepared. *Remsen's Organic Chemistry. Spring term, full study.* Professor PALMER.

Required: Chemistry 3a.

5a. QUANTITATIVE ANALYSIS.—General principles and practices of gravimetric quantitative analysis, beginning with salts of definite composition. The purpose here is to gain facility and accuracy of manipulation together with a knowledge of the principles involved in the best practice. Lectures and assigned text from *Fresenius's Quantitative Analysis* accompanying the laboratory work. *Fall term, full study.* Professor PARR.

Required: Chemistry 3b.

5b. QUANTITATIVE ANALYSIS CONTINUED.—This course includes volumetric analysis and the analysis of silicates; as, feldspars, clays, etc. *Winter term, full study, laboratory work three hours daily.* Professor PALMER and Dr. GRINDLEY.

Required: Chemistry 5a.

5c. Examination and analysis of foodstuffs, milk, butter, etc. Sanitary examination of air, or analysis of agricultural products, materials, fertilizers, etc.—*Spring term, full study, laboratory work three hours daily.* Professor Palmer and Dr. Grindley.

Required: Chemistry 5b.

6. Technological Chemistry.—This is lecture-room work only and comprises a study of technological chemistry as illustrated in those industries having a chemical basis for their principal operations and processes. Much use is made of the journals. *Winter and spring terms, half study. Wagner's Chemical Technology.* Professor Parr.

Required: Chemistry 2, 3b.

7. Advanced General Chemistry.—A course in physical chemistry including thermo-chemistry, consisting mainly of laboratory work. It comprises determinations of vapor density, specific heat, depression of freezing point, elevation of boiling point, and calculation of molecular and atomic weights from the data thus obtained, followed by use of calorimeter, polariscope, and other instruments, in determining such constants as serve in characterization or for quantitative estimation of chemical substances, or which serve as the basis of theoretical generalizations. Occasional lectures and the reading of assigned subjects accompany the laboratory work. *Fall, winter, or spring terms, full study.* Professor Palmer.

Required: Chemistry 2, 5b; Physics 1, 3.

8. Iron and Steel Analysis.—This course is devoted to iron and steel analysis. Methods for determination of all the constituents are studied, including both rapid and standard methods, especial attention being given to technical methods for determination of phosphorus and sulphur. *Spring term, full study.* Professor Parr and Mr. White.

Required: Chemistry 5b.

9. Organic Chemistry.—The work of this course consists in the detailed discussion of the characteristics of several of the more typical and simple organic compounds, followed by the briefer consideration of most of the important classes of the derivatives of carbon. The instruction comprises lectures, recitations upon assigned subjects, and laboratory work. *Richter's Organic Chemistry* is used as reference and text book. The laboratory work includes the preparation of organic compounds in ac-

cordance with the directions given in the manuals of *Cohen*, *Fischer*, and *Levy*, and the ultimate analysis of several of the finished products. *Winter and spring terms, full study.* Prof. PALMER, Dr. GRINDLEY.

Required: Chemistry 2, 5a.

10. SANITARY ANALYSIS.—Chemical examination of potable and mineral waters. Detection and estimation of some of the most important poisons, organic and inorganic. *Full term, full study.* Professor PALMER.

Required: Chemistry 5a.

11. INVESTIGATIONS AND THESIS.—Candidates for graduation from the chemical courses are required to devote at least three hours per day for two terms to the investigation of some selected chemical subject, the results of which are to be embodied in a thesis. The choice of subject should be made early in the year. It must be determined upon by consultation with the professors of chemistry before the first Monday in November. Between that time and the beginning of the winter term an index to the bibliography of the subject must be prepared and presented to the professor who is in charge of the investigation. In the research work the student is required to make full use of the various sets of journals, not only for the purpose of preparing himself for the experimental portion of the work and arranging a proper introduction to the thesis, but also as an essential means of extending his acquaintance with chemical literature and drill in consultation of works of reference. *Winter and spring terms, full study.* (A) General, Professor PALMER; (B) Technological, Professor PARR.

Required: Chemistry, 13 credits.

12. THEORETICAL CHEMISTRY.—A course of instruction which includes discussions of the principles and theories of general chemistry. *Ostwald's Outlines of General Chemistry. Winter and spring terms, two-fifths study.* Professor PALMER.

Required: Chemistry 4 and 5a.

13. AGRICULTURAL CHEMISTRY.—A course of lectures upon the chemical principles and processes involved in agriculture, taken conjointly with laboratory practice in analysis of agricultural products and materials. *Winter and spring terms, full study.* Dr. GRINDLEY.

Required: Chemistry 5a.

14. METALLURGY.—Especial attention is given to the effect of impurities in ores upon metallurgical processes and finished

products. Fuels, refractory materials, and fluxes are described and their value and application explained. A series of models of furnaces and specimens of furnace material and products are used in illustration. Much use is made of publications and of methods setting forth the present practice of actual plants in operation. *Fall term, full study.* Professor PARR.

Required: Chemistry 8.

15. METALLURGICAL CHEMISTRY AND ASSAYING.—This course includes: (*a*), the analysis of finished metallurgical products: as, commercial lead, spelter, aluminum, copper, etc.: and (*b*), the fire assay of lead, gold, and silver ores. Fluxes, reagents, and charges are studied in connection with various typical ores and practice given in the use of the crucible and muffle furnaces and in the manipulations connected with fire assaying. *Fall term, full study or either division alone, half study.* Professor PARR and Mr. WHITE.

Required: Chemistry 5b.

16. CHEMISTRY FOR ENGINEERS.—This course is arranged particularly for mechanical engineers. It involves the proximate analysis of coals, determination of calorific power, technical analysis of furnace gases, examination of boiler waters, etc. *Winter term, full study.* Professor PARR and Mr. WHITE.

Required: Chemistry 1.

17. INDUSTRIAL CHEMISTRY.—A laboratory course in the preparation of chemical products from raw materials. The manufacture and proving of pure chemicals, fractionation, and other processes of the manufacturing chemist. *Winter term, full study.* Professor PARR.

Required: Chemistry 5b.

18. SPECIAL ADVANCED COURSES. — Special laboratory courses as indicated below may be arranged for those competent to pursue them. From one-fifth to three credits will be allowed in the under-graduate courses for such work.

(*a*) Technical Gas Analysis $\frac{1}{5}$ credit.

(*b*) Urinalysis $\frac{2}{5}$ credit.

(*c*) Toxicology $\frac{2}{5}$ credit to 2 credits.

(*d*) Metallurgical Chemistry, 1 to 3 credits. Professors PALMER and PARR.

19. SEMINARY.—Reports and discussions upon assigned topics from current chemical literature. One session each week during the junior and senior years. Professors PALMER and PARR.

20. Quantitative Analysis.—An elementary course intended especially for such students of other departments as desire some training in the processes of quantitative analysis, but have not the time or the opportunity to enter the regular course in this subject (Chem. 5). The work may vary in character, to some extent, according to the need of the individual student. *Spring term, full study.* Professor Palmer and Mr. White.

Required: Chemistry 3a.

CIVIL ENGINEERING.

1. Land Surveying.—Areas and distances by chain, compass, and plane table; U. S. public land surveys, including legal points involved in the re-establishment of boundaries; magnetic variation, and determination of true meridian. The students solve numerous problems in the field with instruments. To facilitate practice in surveying, an area has been specially prepared in which the difficulties of plane surveying are presented to the beginner as he is able to meet them, and where he is taught practical methods of overcoming them. All possible distances, directions, areas, and elevations are accurately known; and hence the instructor knows before hand the precise result which the student should obtain. This is an incentive to the student and enables the teacher to show him the degree of accuracy attained, and also to point out errors. *Bellows and Hodgman's Surveyors' Manual. Full term, full study.* Assistant Professor Pence.

Required: General Engineering Drawing 1, 2, 3, 4; Math. 4.

2. Topographical Drawing and Surveying.—Topographical drawing is given during the bad weather of the winter term. The student spends about half a term making the standard topographical symbols. During the spring term topographical surveying is taught, in which students solve problems with the plane table and the stadia, and make a topographical survey and plot the notes. This and course 3 must be taken together. *Winter and spring terms, half study.* Assistant Professor Pence.

Required: Math. 4; General Engineering Drawing 1, 2, 3, 4; Civil Engineering 1.

3. Transit Surveying and Leveling.—Construction, adjustment, and use of the transit and level; angles, inaccessible distances, and areas with the transit; profiles and contours with

the level. Two weeks' time is given to practice in running railroad curves. The department is provided with the instruments necessary for the different branches of engineering field practice, including chains, tapes, compasses, plane tables, stadias, transits, levels, barometers, sextants, and solar transits. These instruments are in constant use by the students whenever the weather will permit. This and course 2 must be taken together. *Baker's Engineers' Surveying Instruments. Winter and spring term, full study.* Assistant Professor PENCE.

Required: Math. 4; General Engineering Drawing 1, 2, 3, 4; Civil Engineering 1.

4. RAILROAD ENGINEERING.—In the field practice the class makes preliminary and location surveys of a line of railroad of sufficient length to secure familiarity with the methods of actual practice. Each student makes a complete set of notes, maps, profiles, calculations, and estimates. In addition to the mathematical theory of curves, turnouts, crossings, and the calculations of earth work, instruction is given by means of text books, assigned reading, and lectures on the principles of economic location, particularly the effect of distance, grade, and curve upon operation and maintenance, and of methods of construction, equipment, and maintenance of way. *Godwin's Railroad Engineer's Field-Book. Fall term, full study; winter term, half study.* Assistant Professor PENCE.

Required: Math. 4; General Engineering Drawing 1, 2, 3, 4; Civil Engineering 1, 2, 3.

5. MASONRY CONSTRUCTION.—Requirements and methods of testing stone, brick, cement, and lime; composition, preparation, and strength of mortar and concrete; classification, construction, strength, cost of stone and brick masonry; foundations under water; theory of stability, cost, etc., of dams, retaining walls, bridge piers, bridge abutments, culverts, and arches. The students have experiments in the masonry laboratory, in testing cement, mortar, stone, and brick. *Baker's Masonry Construction. Fall term, full study.* Professor BAKER.

Required: Math. 2, 4, 6, 7, 8, 9; Theoretical and Applied Mechanics 1, 2; General Engineering Drawing 1, 2, 3, 4.

6. GEODESY.—Geodesy is taught by lectures and assigned reading. Studies are made of the instruments and methods employed in spirit, barometrical, and trigonometrical leveling; the apparatus and methods used in measuring base lines; the loca-

tion and construction of stations; the method of measuring the angles and reducing the triangulation: the principles of projecting maps: the methods employed in running parallels and meridians. The apparatus consists of a 12-inch alt-azimuth instrument reading to single seconds, a precise level, aneroid and mercurial barometers, three wooden base rods, a comparator, a steel tape with level, thermometer, and spring balance. Problems are solved in barometrical, trigonometrical, and precise leveling, and in reading horizontal angles. *Fallt erm, half study.* Professor BAKER.

Required: Math. 4; General Engineering Drawing 1, 2, 3, 4: Civil Engineering 1, 3; Descriptive Astronomy 2.

7. PRACTICAL ASTRONOMY.—Lectures, recitations, and practice. The object is to familiarize the students with those principles of practical astronomy employed in extended surveying operations, and also to train the student in methods of exact observations. The apparatus consists of an observatory with five isolated stone piers: a 12-inch alt-azimuth instrument reading by micrometers to single seconds, both of altitude and azimuth; an astronomical transit: three chronometers; two sextants: two solar transits: and a set of meteorological instruments. The problems include the adjustments of all the instruments, and the determination of time, latitude, and azimuth by the several methods. *Loomis's Practical Astronomy. Fall term, half study.* Professor BAKER.

Required: Math. 4, General Engineering Drawing 1, 2, 3, 4: Civil Engineering 1, 3; Astronomy 2.

8. BRIDGES.—The instruction in bridges occupies two terms. (1) The first—bridge analysis—is devoted to the calculations of the strains in the various forms of bridge trusses, by algebraic and graphical methods, consideration being given to weights of bridge and train, and force of wind. (2) The second—bridge design—is devoted to designing bridges, proportioning sections, and working out details. Each student designs and makes a full set of drawings of a bridge. The apparatus consists of a series of full sized joints and connections of a modern iron railroad bridge, numerous models of bridges, a large collection of drawings, photographs, and lithographs of bridges. *Johnson's Modern Framed Structures. Winter and spring terms.* Professor BAKER.

Required: Math. 2, 4, 6, 7, 8, 9: General Engineering Drawing 1, 2, 3, 4; Theoretical and Applied Mechanics 1, 2; Architecture 6.

9. TUNNELING.—This course treating of methods of tunneling and mine attack, is given to students of civil engineering. The lectures treat first of the nature and use of explosives, compressed air, and power drills. The methods of tunneling are then explained and discussed, with their accompanying methods of timbering and walling. Attention is given to the sinking of shafts for the working of tunnels, or for the purpose of driving. The details of the duties of a tunnel engineer are made as clear and concise as possible. Students are required to make written reports upon the methods employed in particular tunnels. Some time is given in the earlier part of the course to the practice in boring wells, dredging, quarrying, and subaqueous blasting. *Spring term, full study.* Professor BAKER.

Required: Math. 2, 4, 6: General Engineering Drawing 1, 2, 3, 4; Mechanical Engineering 1, 4; Chemistry 1: Physics 1.

10. SURVEYING.—For students in the courses of architecture, architectural engineering, and mechanical engineering. Areas with chain and compass, U.S. public land surveys, and principles of re-establishing corners: use of transit in finding distances, areas, and in laying out buildings; use of the level in finding profiles and contours. *Baker's Engineers' Surveying Instruments. Spring term, full study.* Assistant Professor PENCE.

Required: Math. 4: General Engineering Drawing 1, 3, 4; Physics 1.

11. STRUCTURAL DETAILS.—A study is made of joints and connections in wood and iron. Special attention is given to faulty methods of construction and to impress upon the student the importance of correctly proportioning the smallest details. Each student makes, preferably during the summer vacation preceding his senior year, a full detailed measurement of a pin-connected railway or highway bridge. In the class room he makes a drawing of the structure, computes the stresses, and reports upon the efficiency of each detail. *Lectures, reference books and drawings. Winter term, full study.* Professor BAKER.

Required: Math. 2, 4, 6, 7, 8, 9: General Engineering Drawing 1, 2, 3, 4: Theoretical and Applied Mechanics 1, 2; Architecture 6: and free hand sketches with dimensions showing full details of a bridge measured by the student.

DRAWING, GENERAL ENGINEERING.

1. ELEMENTS OF DRAUGHTING.—This term's work is designed as a general preparation for draughting in all branches. Its

aim is, first, to teach the accurate and intelligent use of instruments and materials; and, second, to start the student upon his work with those neat and orderly habits that are invaluable to the competent draughtsman.

The instruction is given by lectures and reference to books in the University library. The problems are arranged so as to be of the most practical benefit to the student, and, instead of being copies of similar problems, are designed to throw him upon his own ingenuity in applying his knowledge of principles learned. This work includes geometrical constructions; orthographic, isometric, and cabinet projections of objects from models or given data; drawings finished in line shading and water colors, in all about thirty plates. *Lectures and Blue Prints. Fall term, two-fifths study.* Mr. PHILLIPS and Mr. VIAL.

2. DESCRIPTIVE GEOMETRY.—The first term's work in this study includes problems on the point, line, and plane, some of the simpler geometrical solids, and shades and shadows. The second term's work takes up plane, single-curved, double-curved, and warped surfaces; the generation and development of the same; sections and inter-sections. The application of principles and methods in numerous and varied practical problems is a large part of the work in each term, comprising in all the drawing of about thirty-nine plates. *Church's Descriptive Geometry. Winter term, full study; spring term, half study.* Mr. PHILLIPS and Mr. VIAL.

Required: General Engineering Drawing 1, 4.

3. LETTERING.—Plain and ornamental alphabets; round and stump writing; titles and title pages. *Spring term, half study.* Mr. PHILLIPS and Mr. VIAL.

Required: General Engineering Drawing 1, 4.

4. SKETCHING.—In orthographic, isometric, and cabinet projections. Architectural sketch plans and details; machines, machine parts, and mechanisms. Lectures and Notes. *Fall term, three-fifths study.* Mr. PHILLIPS and Mr. VIAL.

ECONOMICS.

The following courses run through two years. Those which have a letter following the number are given every other year, alternating with those which have a corresponding number but no letter. The others are repeated each year. Courses 1 and 2, or 2a, are continuous, but course 1 may be taken by itself.

1. PRINCIPLES OF ECONOMICS (Elementary Course).—This course is preliminary to all others. It is intended to serve as an introduction to the courses which follow and also to give a general survey of the field of the science for the benefit of those who cannot pursue the subject further. *Fall and winter terms, full study.* Professor KINLEY.

2. PRACTICAL ECONOMIC PROBLEMS.—The purpose of this course is to give the student a general knowledge of some of the more important practical questions of the times. No text book is used, but topics are assigned for investigation, and the results presented in debates, followed by general discussion. Written reports will, as a rule, be required from those who lead the debates, in addition to the oral presentation, and a written summary of each debate from each member of the class. The class will meet twice a week, two hours at a time. *Spring term, full study.* Professor KINLEY.

Required: Economics 1.

2a. MONEY AND BANKING.—In this course a study of the history and functions of money is followed by a critical study of the monetary and banking history of the United States and of such topics as the theory of prices, credit, government paper, etc. The method pursued is that of Economics 2, supplemented by lectures. *Spring term. full study.* Professor KINLEY.

Required: Economics 1. (*Not given in 1895–96.*)

3. PUBLIC FINANCE.—The purpose of this course is the historical, comparative, and critical study of the methods and purposes of public expenditure, and of the different sources of revenue, and also the discussion of public debts, their placement, refunding, and redemption. Those who enter the course must take both terms' work. Graduate students will receive credit as such for the course, provided they have had Economics (1) and (2), or their equivalent, do additional reading assigned in Wagner, Cohn, Beaulieu, and other writers, and also prepare one extended paper, or two shorter ones, on topics connected with the course. *Fall and winter terms, three-fifths study.* Professor KINLEY.

Required: Economics 1. (*Not given in 1895–96.*)

3a. FINANCIAL HISTORY OF THE UNITED STATES.—This course begins with Hamilton's administration of the treasury. It deals with the growth and management of the national debt, and with the industrial expansion and the tariff history of the

country. While the necessary logical separation is observed in the treatment of these subjects, their intimate connection is also emphasized and the economic development of the country as a whole is studied. The course may be taken as a graduate course on conditions similar to those laid down in (3). For graduate students the course will be purely investigative. They must, however, attend the lectures and report from time to time the results of their special investigations and summaries of their additional assigned reading. *Fall and winter terms, three-fifths study.* Professor KINLEY.

Required: Economics 1.

4. STATE AND LOCAL TAXATION IN THE UNITED STATES.—This course is a comparative study of taxation in the various states, and also in the cities so far as they present features of special interest. Special attention is given to taxation in Illinois. *Spring term, full study.* Professor KINLEY.

Required: Economics 3 or 3a.

5. RAILROAD PROBLEMS.—This is a short course designed to familiarize the student with the problems of railway management in their economic, social, and legal aspects. Comparison is made of the development of railroad transportation and its regulation in Europe and the United States. Rates, financial methods of construction, competition, pooling, etc., are discussed, as is also the question of state ownership and management. *Spring term, full study, three times a week.* Professor KINLEY.

Required: Economics 1. The course is open, without the requirement in Economics, to students in the College of Engineering who have taken engineering 4. (*Not given in 1895-96.*)

5a. STATISTICS.—The aim of this course is to give instruction in the purposes, methods, and scope of statistics. At the opening of the course a number of lectures will be given on these topics; after that the work will be entirely investigative, the collection of data, tabulation, graphic representation, generalization, etc. Each student must complete at least four subjects of investigation in the line indicated by the requirement which he offers to enter the course. The intelligent manipulation of the ordinary mechanical appliances in statistical work is required. *Spring term, full study, three times a week.* Professor KINLEY.

Required: Economics 1. The course is open, without the requirements in economics, to students who have taken any one

of the following subjects: Agriculture 1 or 7; Architecture 4; Municipal Engineering 3; Chemistry 10, 12, or 13, Mathematics 6; Meteorology 1.

6. SOCIOLOGY.—In this course it is intended to study society in its normal structure. The theories of the nature of society, which have been advanced by various writers, are discussed in the light of the history of social institutions, and an effort is made to formulate some of the laws of social growth. *Full and winter terms, two-fifths study.* Professor KINLEY.

Required: Some course in history or general biology.

7. SOCIAL PATHOLOGY.—This is a course in "applied sociology," consisting of as detailed a study of the problems of charity and crime as the time will permit, together with a consideration of theories and methods of reform. *Spring term, two-fifths study.* Professor KINLEY.

Required: Economics 6. (*Not given in 1895–96.*)

7a. SOCIAL PROBLEMS.—This course alternates with (7), and each forms a sequence with (6). The purpose of the course is to examine in some detail such problems as divorce, strikes, "sweating," and social settlements and other methods of social improvement. *Spring term, two-fifths study.* Professor KINLEY.

Required: Economics 6.

8. ECONOMIC SEMINARY.—Advanced students will be formed into a seminary for investigation and for the study of current economic literature. No student can be admitted who has not taken at least one full year's work in Economics. The seminary will meet at least once in two weeks for two hours, throughout the year. Professor KINLEY.

100–1 See *Economics* under *Graduate School.*

ELECTRICAL ENGINEERING.

1. DYNAMO-ELECTRIC MACHINERY.—Lectures and Laboratory. Theory, design, classification, and tests of dynamo-electric machinery. This course is intended for students in Mechanical Engineering, and for others who need only a superficial acquaintance with dynamos and the necessary testing apparatus. *Spring term, full study.* Mr. ESTY.

Required: Physics 1 and 3.

2. ELECTROMAGNETISM.—(1) Lectures on the theory and classification of electromagnets. (2) Experimental study of

electromagnets. (3) Electrical designing and draughting. *Spring term, full study.* Professor SHEA, Mr. ESTY, and Mr. SWENSON.

Required: Physics 4.

3. DYNAMO-ELECTRIC MACHINERY.—(1) Lectures on theory of dynamo-electric machinery, particularly direct current machines. (2) Experimental study of dynamo-electric machinery, particularly direct current machines. (3) Electrical designing and draughting. *Fall term, full study.* Professor SHEA, Mr. ESTY, and Mr. SWENSON.

Required: Electrical Engineering 2.

4. ALTERNATING CURRENTS AND ALTERNATING CURRENT MACHINERY.—(1) Lectures on the theory and application of alternating currents. (2) Experimental study of alternating currents and alternating current machinery. (3) Electrical designing and draughting. *Winter and spring terms, full study.* Professor SHEA, Mr. ESTY, Mr. SWENSON.

Required: Electrical Engineering 3.

5. PHOTOMETRY.—Lectures and Laboratory. Study of arc and incandescent lamps in connection with their use in electric lighting. *Winter term, half study.* Mr. SWENSON.

Required: Electrical Engineering 3.

6. ELECTRIC COMMUNICATION.—Lectures and practice. This course includes the theory of the telephone, the telegraph, and electric signaling devices, and the construction, protection, and operation of lines. *Winter term, full study.* Mr. ESTY.

Required: Electrical Engineering 3.

7. ELECTRO-METALLURGY.—Lectures and Laboratory. Theory of electrolysis and practice in treatment of ores and electrolytic separation and refining of metals. *Winter term, half study.* Mr. ESTY.

Required: Electrical Engineering 3.

8. LIGHTING PLANTS.—Lectures, testing, and draughting. This course includes the construction and use of arc and incandescent lamps; the methods of wiring for arc and incandescent lighting; rules and regulations, the equipment, and management of electric lighting stations; estimates. *Spring term, full study.* Mr. SWENSON.

Required: Electrical Engineering 4, 5.

9. ELECTRICAL TRANSMISSION OF POWER.—Lectures, tests, and draughting. This course includes the construction, equip-

ment, and operation of electric railways and stations; the utilization of water power; long distance transmission; applications of electricity in various engineering operations; estimates. *Spring term, full study.* Professor SHEA, Mr. SWENSON.

Required: Electrical Engineering 4 and 5.

10 a and b. SEMINARY.—Critical Discussion of current periodical literature of general physics and applied electricity. *Fall, winter, and spring terms, once a week.* Professor SHEA.

ENGLISH LANGUAGE AND LITERATURE.

1. GENERAL SURVEY OF ENGLISH LITERATURE.—Prescribed for sophomore year in College of Literature and Arts. *Fall, winter, and spring terms, two-fifths study.* Assistant Professor KATHARINE MERRILL.

2. PROSE WRITERS OF THE EIGHTEENTH AND NINETEENTH CENTURIES.—*Fall, winter, and spring terms, three-fifths study.* Assistant Professor KATHARINE MERRILL.

[English 1 and 2 are intended to furnish a full credit to students in the colleges of Engineering, Science, and Agriculture.]

3. POETRY OF THE NINETEENTH CENTURY.—*Fall, winter, and spring terms, three-fifths study.* Assistant Professor KATHARINE MERRILL.

4. PROSE WRITERS OF THE SIXTEENTH AND SEVENTEENTH CENTURIES.—*Fall, winter, and spring terms, two-fifths study.* Professor DODGE.

5. SHAKSPERE AND HISTORY OF THE DRAMA.– Primarily for graduates. *Fall, winter, and spring terms, three-fifths study.* Professor DODGE.

Required: English 1, 2, 3, and 4.

6. HISTORY OF ENGLISH CRITICISM.—Primarily for graduates. *Fall, winter, and spring terms, two-fifths study.* Professor DODGE.

Required: English 1, 2, 3, and 4.

7. SEMINARY: COMPARATIVE MODERN FICTION.—Assistant Professor KATHARINE MERRILL. Open to senior and graduate students.

8. OLD ENGLISH (ANGLO SAXON) GRAMMAR AND PROSE.—*Fall, winter, and spring terms, three-fifths study.* Professor DODGE.

9. EARLY ENGLISH.—*Fall, winter, and spring terms, two-fifths study.* Professor DODGE.

Required: English 8.

10. OLD ENGLISH POETRY.—*Fall, winter, and spring terms, three-fifths study.* Professor DODGE.

Required: English 8 and 9.

11. FOURTEENTH AND FIFTEENTH CENTURY LITERATURE.—*Fall, winter, and spring terms, two-fifths study.* Professor DODGE.

Required: English 8, 9, and 10.

[English 10 and 11 are primarily for graduates, but are open to undergraduates having the necessary preparation.]

12. HISTORY OF THE ENGLISH LANGUAGE.—One hour a week. *Fall, winter, and spring terms, two-fifths study.* Professor DODGE.

Required: English 8 and 9.

13. ICELANDIC.—*Fall, winter, and spring terms, full study.* Professor DODGE.

Required: English 8 and 9 or German 1.

14. OLD ENGLISH LEGAL CODES.—Special course for students of politics, economics, and history. As an introduction to the course Early English Grammar is studied so far as is necessary for a proper understanding of early phraseology. Primarily for graduates, but open to undergraduates having sufficient preparation. *Fall, winter, and spring terms, two-fifths study.* Professor DODGE.

Required: One year of history, economics, or sociology, or of English literature.

FRENCH.

See Romance Languages and Literatures 1 to 5; 100, 101, pp. 160–1.

GEOLOGY.

1. GEOLOGY, MAJOR COURSE.—(*a*) Dynamic Geology. The instruction given under this head is intended to familiarize the student with the forces now at work upon and within the earth's crust, modeling its reliefs, producing changes in the structure and composition of its rock masses and making deposits of minerals and ores. A series of localities is studied in which great surface changes have recently taken place, with a view to ascertaining the character of the forces producing such changes, and the physical evidence of the action of like forces in the past. The subject is taught by lectures, and is abundantly illustrated by maps, models, charts, and views.

(*b*) Petrographic Geology. The instruction under this topic is given by lectures and laboratory work. The subjects included

are the classification of rocks, the methods used in their determination, the conditions governing the formation of each species, the decompositions to which they are liable, and the products of these decompositions. Each student is supplied with a set of blowpipe tools and reagents and a series of hand specimens covering all the common species of rocks.

(*c*) Historical Geology. The work on this subject is substantially an introduction to the history of geology as a science, and the developmental history of the leading geological doctrines. An attempt is also made to trace the history of each geological period, so far as may be done with the data in hand.

(*d*) Paleontology. The scheme of instruction in this subject places before the student the classification adopted for those organic forms occurring as fossils, together with the succession of the various groups that occur in the strata, with the cause, as far as known, for their appearance and disappearance. The student is required to familiarize himself with selected groups of paleozoic fossils, abundant illustrations of which are placed in his hands. The subject is presented in lectures and demonstrations, each group being considered in connection with its nearest living representative.

(*e*) Economic Geology. The final term of this course is devoted to a study of the uses man may make of geologic materials, the conditions under which these materials occur, and the qualities which render them valuable. The instruction is given by lectures, with reference to the various state and government reports, transactions of societies, and monographs in which these subjects are treated, as well as by demonstrations with materials from the collections of the University.

In dynamic and historical geology Dana's manual is used as a reference book, and in economic geology Tarr's Economic Geology of the United States. Petrography is pursued by means of a blue-print adaptation of Rosenbusch for the crystalline rocks, and various authors for the fragmental. In paleontology Nicholson and Zittel are used for descriptions of the larger groups, Miller for general distribution, and the various state surveys for species. *Winter, spring, and fall terms, full study.* Professor ROLFE and Mr. MOSIER.

Required: Chemistry 3b; Mineralogy 1.

2. INVESTIGATIONS AND THESIS.—For students who select a geological thesis guidance and facilities will be afforded for in-

dividual investigations in the field and laboratory. *Winter and spring terms, full study.* Professor ROLFE.

Required: Geology 1.

3. ENGINEERING GEOLOGY. (For engineers only.)—It is the object of this course to bring together those parts of geology which will be of the greatest practical benefit to an engineer. The course will deal mainly with subjects connected with the origin, classification, and transformation of rocks, with the principles which govern the deposition and structure of rock masses: with the conditions under which the useful rocks and minerals occur, and the conditions which make them more or less valuable. The instructionis given by lectures and by demonstrations in the laboratory. *Spring term, full study.* Professor ROLFE and Mr. MOSIER.

4. GENERAL GEOLOGY, MINOR COURSE.—This course includes a selection of such geological facts and theories as should be known to every intelligent person, with such discussion of them as the time will permit. The subjects treated will be fully illustrated, and opportunity will be afforded for some study of rocks and fossils. *Winter term, full study.* Professor ROLFE.

GERMAN.

There are four years of instruction given in German. The first is devoted to the study of grammar supplemented by reading. In the second year a select course of analytical as well as rapid and sight reading is followed with exercises in composition and conversation. In the third the study is conducted in German; the history of literature is studied from a manual and by lectures accompanied with critical reading of classic and latest authors. The fourth year is primarily intended for graduate work and is devoted to the study of the Gothic, the Old High German, and the Middle High German, with lectures on the literature of these periods, and study of the history of the languages.

1. FOR STUDENTS IN COLLEGE OF LITERATURE AND ARTS.—*Joynes-Meissner's German Grammar, Joynes's German Reader, Bernhardt's Im Zwielicht, Storm's Immensee, Gerstaecker's Germelshausen,* etc. *Fall, winter, and spring terms, full study.* Assistant Professor Mrs. BRUNER.

2. FOR STUDENTS IN COLLEGE OF LITERATURE AND ARTS.—Reading, composition, and conversation. A selection of Classics:

Goethe's Iphigenie, Hermann und Dorothea, or *Torquato Tasso; Schiller's Maria Stuart, Wilhelm Tell*, or *Jungfrau von Orleans*, etc. Also selections of modern prose: *Freytag's Aus dem Staat Friedrich's des Grossen; Jenson's Die Braune Erica; Fouqué's Undine; Stifter's Das Haidedorf; Scheffel's Ekkehard*, etc. *Fall, winter, and spring terms, full study.* Professor SNYDER and Assistant Professor ELIZABETH C. BRUNER.

Required: German 1.

3. FOR STUDENTS IN COLLEGE OF LITERATURE AND ARTS.—History of German Literature, with lectures. Assigned reading and reports thereon. *Bernhardt's Goethe's Meisterwerke; Lessing's Nathan der Weise, or Minna von Barnhelm; Schiller's Wallenstein; Buchheim's Deutsche Lyrik*, and selections from modern authors. *Fall, winter, and spring terms, full study.* Professor SNYDER and Assistant Professor ELIZABETH C. BRUNER.

Required: German 1, 2.

4. FOR STUDENTS IN COLLEGE OF LITERATURE AND ARTS.—*Gothic Grammar and Reader (Wright): Old High German Grammar and Reader; Middle High German Grammar and Reader.* Lectures on the formative periods of the language and their literature through the year. *Fall, winter, and spring terms, three times a week, full study.* Professor SNYDER.

Required: German 1, 2, 3.

5. SPECIAL COURSE IN SCIENTIFIC AND TECHNICAL GERMAN.—*Joynes-Meissner's German Grammar, Part I.; Bernhardt's Im Zwielicht I.; Gerstaecker's Germelshausen; Stœkl's Unter dem Christbaum*, etc. *Fall, winter, and spring terms, full study.* Mr. R. P. SMITH.

In the spring term the class will be divided into sections for the study of technical and scientific German suited to the demands of the different colleges, each student working in his own special line. Particular attention will be given to acquiring a technical vocabulary and to rapid reading.

6. SPECIAL SCIENTIFIC READINGS.—Reading of more advanced scientific German than in course 5 and on same plan. *Winter and spring terms, full study.* Mr. R. P. SMITH.

Required: German 1 or 5.

GREEK.

1. SELECTIONS FROM XENOPHON'S HELLENICA, with prose composition throughout the term. Studies in syntax will be

prosecuted by making a systematic collation of the examples in the text. Library references to important matters, suggested by the narratives read will be given, and summaries required. *Fall term, full study.* Professor MOSS.

2. SELECTIONS FROM HERODOTUS, with readings from Thucydides for comparison of style and historic method. Studies in Ionic etymology. Greek prose once a week, with particular reference to the syntax of the verb. *Winter term, full study.* Professor MOSS.

Required: Greek I.

3. XENOPHON'S MEMORABILIA. — Lectures upon the work and influence of Socrates as a public teacher, with collateral readings upon assigned topics. Greek prose once a week. *Spring term, full study.* Professor MOSS.

Required: Greek 1, 2.

4. ANDOCIDES *De Mysteriis*, with one of the shorter orations of Lysias, and Demosthenes. The development of oratory among the Greeks, by lectures and library references. *Fall term, full study.* Professor MOSS.

Required: Greek 1, 2, 3.

5. PLATO.—One entire dialogue and parts of others. Studies in the rhetoric and idiom of the author. Discussion of his philosophical views, so far as touched in the pieces read, with special reference to their antecedents. *Winter term, full study.* Professor MOSS.

Required: Greek 1, 2, 3, 4.

6. GREEK TRAGEDY.—In 1895-6 Sophocles' Oedipus Rex and one play of Aeschylus or Euripides will be read. Their history and method of production will be studied in connection with the history of the Greek drama, and of the construction of the Greek theatre. *Spring term, full study.* Professor MOSS.

Required: Greek 1, 2, 3, 4, 5.

7. SEMINARY, BASED UPON HOMER.—Portions of the text will be assigned to each student to be read and used as a basis for the investigation of special topics. The results of such study will be read before the class, and be discussed and criticised. For the purpose of such study the library is well equipped with books, and the department with various appliances. *Fall term, full study.* Professor MOSS.

Required: Greek 1, 2, 3, 4, 5, 6.

8. SEMINARY.—Continuation of Course 7. *Winter term, counts as full study.* Professor MOSS.

Required: Greek 1, 2, 3, 4, 5, 6.

9. COURSE OF SEMI-WEEKLY LECTURES upon various phases of old Greek life, political, social, economic, etc. When needful the lectures will be illustrated by numerous photographs at hand, or by stereopticon views. The class will have readings prescribed, collateral to the subjects treated, which are to be synopsized and presented for criticism. *Spring term.* For those who take the lectures only, *half study*, for others counts as *full study.* Professor MOSS.

HISTORY.

1. MEDIÆVAL AND MODERN EUROPEAN HISTORY.—Elementary introductory course. *Fall, winter, and spring terms, three-fifths study.* Assistant Professor GREENE.

2. THE HISTORY OF MODERN CONSTITUTIONAL GOVERNMENT.—Special attention will be given to the constitutions of England, the United States, France, and Germany. *Fall, winter, and spring terms, two-fifths study.* Assistant Professor GREENE.

3. AMERICAN HISTORY.—The origin and growth of the nation from the beginning of English colonization in North America to the close of the reconstruction period. *Fall, winter, and spring terms, full study.* Assistant Professor GREENE.

Required: History 1 or 2.

4. ENGLISH CONSTITUTIONAL HISTORY.—Special attention is given to the earlier formative period. *Fall, winter, and spring terms, three-fifths study.* [Omitted in 1895-96]. Assistant Professor GREENE.

Required: History 1, 2.

5. EUROPE IN THE SIXTEENTH CENTURY.—The Protestant Reformation and the Counter-reformation. *Fall term, three-fifths study.* Assistant Professor GREENE.

Required: History 1.

6. ENGLAND UNDER THE STUARTS.—The Puritan revolution. *Winter term, three-fifths study.* Assistant Professor GREENE.

Required: History 1.

7. EUROPE FROM 1763 to 1815.—The French Revolution. *Spring term, three-fifths study.* Assistant Professor GREENE.

Required: History 1.

8. SEMINARY IN AMERICAN HISTORY.—Training in the use of the sources. Once a week for two hours throughout the year. *Two-fifths study.* Assistant Professor GREENE.

Course 8 is open to graduates and also to seniors of high standing who take or have taken History 3. Students who propose to write their baccalaureate theses in this department are strongly urged to do so in connection with the work of course 8.

Courses 4, 5, 6, 7, 8 may be taken as full studies by graduates and seniors of high standing who are willing to do a prescribed amount of additional work.

HORTICULTURE.

1. INTRODUCTORY COURSE.—This course is intended to give a general idea of horticultural work such as all students of agriculture should have, and at the same time to prepare those who wish it for more advanced work along the same lines.

Studies are made in the planting and care of nurseries, orchards, vineyards, small fruits, gardens, and ornamental grounds. Students are given practice in propagating by grafts, buds, cuttings, seeds, etc.; in the pruning, training, or other management of different fruits, in transplanting and in the preparation of and use of remedies against insects and diseases. *Barry's Fruit Garden, lectures, reference reading, and laboratory work. Full term, two-fifths study: and spring term, three-fifths study.* Mr. MCCLUER.

2. FRUIT CULTURE.—Orchards, vineyards, small fruit plantations, and their products constitute the main subjects of this term's work. Lectures are given upon propagating, planting, and cultivating trees and vines: upon identifying, classifying, and preserving fruits, and upon diseases and remedies. Studies are made upon illustrative material in the laboratory, and visits to the orchards and plantations form a part of the instruction. *Full term, full study.* Mr. MCCLUER.

3. FORESTRY.—This course embraces a study of forest trees and their uses, their natural distribution, and their artificial production. The relations of forest and climate are studied, and the general topics of forestry legislation and economy are discussed. *Lectures. Winter term, two-fifths study.* Professor BURRILL.

4. PLANT HOUSES AND HOUSE PLANTS.—This study includes gardening and landscape architecture; the methods of construc-

tion, heating and ventilation, and general management of greenhouses, and the study of the kinds, propagation, growth, and care of flowering plants. Each student has practice in propagating by cuttings and otherwise, in potting and shifting, and in care of plants requiring various treatment. Insects and diseases, with remedies, are treated, and the means of securing vigor of growth and abundance of flowers are studied and illustrated by practice. *Henderson's Practical Floriculture. Winter term, three-fifths study.* Mr. McCLUER.

5. GARDENS.—Kitchen and market gardens are made the first subjects of study, after which ornamental and landscape gardening occupies the time. *Henderson's Gardening for Profit; Long's Ornamental Gardening. Spring term, full study.* Mr. McCLUER.

6. PLANT PROPAGATION.—The modification of plants under cultivation, and the methods of securing and perpetuating desirable variations; self- and cross-fertilization; fertilization with much or little pollen; hybridization; seeds of different degrees of maturity, size, etc.; bud variation and graft hybrids; bud and graft unions; influence of stock on cion, and cion upon stock; whole and piece roots. In this course some account is given of what has been done and an attempt is made to reach conclusions as to what may be done, in the line of the subject. Lectures, reference readings, and laboratory work. *Fall term, full study.* Professor BURRILL and Mr. McCLUER.

Required: Botany 1.

HYGIENE.

See Physical Culture 2.

ITALIAN.

See under Romance Languages and Literature.

LATIN.

1. LIVY.—Selections from the XXI and XXII books. Hannibal and his contest with the Romans. Sight reading, Eutropius. Prose composition based upon the text of Livy in connected passages. A thorough review of noun and verb syntax. *Fall term, full study.* Professor BARTON.

2. CICERO.—De Amicitia and De Senectute. Prose composition based on the text read. An outline of the philosophical

systems then prevalent at Rome. *Winter term, full study.* Professor BARTON.

Required: Latin 1.

3. HORACE.—Selections from the Odes. Roman lyric poetry. *Spring term, full study.* Professor BARTON.

Required: Latin 1, 2.

4 CICERO.—The First book of the Tusculan Disputations: extracts from De Natura Deorum. The religious ideas of the Romans. *Fall term, full study.* Professor BARTON.

Required: Latin 1, 2, 3.

5. HORACE.—Selections from the Satires and Epistles. The private life of the Romans. *Winter term, full study.* Professor BARTON.

Required: Latin 1, 2, 3.

6. PLAUTUS and TERENCE.—Captivi, or Trinummus; Phormio. Roman Comedy. *Spring term, full study.* Professor BARTON.

Required: Latin 1, 2, 3.

7. TACITUS.—Agricola; Annals, Selections. *Fall term, full study.* Professor BARTON.

Required: Latin 1, 2, 3.

8. JUVENAL.—Satires. The social condition of Rome. *Winter term, full study.* Professor BARTON.

Required: Latin 1, 2, 3.

9. VERGIL.—Teachers' Seminary. Extracts from the last six books of the Aeneid. Matters pertaining to the teaching of Latin are discussed, such as the preparation of the teacher, the conduct of the recitation, the aim in Latin instruction and the advantages of the study. The students at intervals take charge of the class. *Spring term, full study.* Professor BARTON.

Required: Latin 1, 2, 3.

10. QUINTILIAN'S PEDAGOGICAL IDEAS.—Selected readings. *Fall term, two-fifths study.* Professor BARTON.

MATERIA MEDICA.

1. MATERIA MEDICA.—The substances and agents used for the prevention or cure of disease and for the preservation of health are studied in this course. The instruction is given by lectures and text books. In the illustrative collections are specimens of all the drugs used. *Dun's Veterinary Materia Medica; Wood's Human Materia Medica. Fall, winter, and spring terms, full study.* Professor MCINTOSH.

MATHEMATICS.

1. ADVANCED ALGEBRA.—For students in the Colleges of Agriculture, Science, Literature, and Arts. Functions and their notations; series and the theory of limits: imaginary quantities; general theory of equations. Topical reviews of all preceding algebraic processes. *Wells's College Algebra. Full term, full study.* Mr. MOGENSON.

2. ADVANCED ALGEBRA.—For students in the college of Engineering. Principles of small practical value are subordinated to those of higher utility. Accuracy and dispatch in the use of principles are continually emphasized. A topical review of principles of elementary algebra is made from time to time. This review is sometimes made by requiring students to solve practical problems illustrative of principles not well understood. Some of the most important subjects in which instruction is given are functions and their notation; the progressions; theory of numbers; permutations and combinations; probabilities; convergency and divergency of series; summation of series; undetermined coefficients; doctrine of limits; logarithms and general theory of equations. *Wells's College Algebra. Full term, full study.* Mr. MOGENSON.

3. TRIGONOMETRY.—For students in the Colleges of Literature and Arts, Science, and Agriculture. Trigonometry, plane and spherical: fundamental relations between the trigonometrical functions of an angle or arc: relations between the functions of different angles or arcs: construction and use of tables: solution of triangles: angles as functions of sides, and sides as functions of angles; applications. *Oliver, Wait, and Jones's Trigonometry. Winter term, full study.* Mr. MOGENSON.

Required: Math. I.

4. TRIGONOMETRY.—For students in College of Engineering. The ratio system is studied chiefly, but the necessary connection between it and the line system is carefully proved and illustrated. Students are frequently required to demonstrate the same proposition, using first the line values, then the ratio values of the functions. The subjects taught are the circular measurement of angles, general formulas of plane and spherical trigonometry, relations between functions of multiples of 90 plus or minus an angle, solution of right and oblique plane triangles, of spherical, right, and oblique triangles, Napier's rules and analogies, and practical applications of principles

to the solution of astronomical problems. Teaching is in part by text book, and in part by assigning principles to be demonstrated and problems to be solved outside of the text book. *Oliver, Wait, and Jones's Trigonometry. Winter term, full study.* Mr. MOGENSON.

Required: Math. 2.

5. CONIC SECTIONS (geometrical method).—Definitions and general properties of the ellipse, hyperbola, and parabola, curvature of the conic sections; elements of analytical geometry. Properties and relations of the point and right line in a plane, and of the conic sections. *Coffin's Conic Sections and Analytical Geometry. Spring term, full study.* Mr. MOGENSON.

Required: Math. 1, 3.

6. ANALYTICAL GEOMETRY.—The aim is to acquaint the student with analytical methods of investigation and to familiarize him with some of the most recent developments in synthetic geometry; to make him more skillful in the use of algebraic processes, especially as a means of demonstrating geometric properties of loci. Subjects considered are the elementary theory of the point and right line in a plane; use of abbreviated notation; elementary theory of the conic sections, their equations and properties developed analytically; poles and polars; synthetic geometry of the circle, and the discussion of the general equation of the second degree. *Newcomb's Analytical Geometry. Spring term, full study.* Mr. MOGENSON.

Required: Math. 2, 4.

7. DIFFERENTIAL CALCULUS.—Variables and functions; limits and infinitesimals; differentials and derivatives; differentiation of explicit functions, implicit functions, and functions of several variables; derivatives of higher orders; successive derivatives; developments in series; maxima and minima of functions; indeterminate forms; plane curves, tangents, and normals; asymptotes, singular points, and curve tracing; theory of envelopes, of curvature, of evolutes and involutes. *Newcomb's Differential and Integral Calculus. Fall term, full study.* Professor SHATTUCK.

Required: Math. 2, 4, 6.

8. ADVANCED ANALYTICAL GEOMETRY.—Position and direction in space; direction and angles; projections of lines, direction cosines; transformation of co-ordinates; the general, and normal equations of the plane; also in terms of the intercepts; the

plane satisfying given conditions: relations of planes to one another; perpendicular distance to a plane; bisectors of dihedral angles; symmetrical equations of a straight line; condition that a line shall be parallel to a plane; equation of the common perpendicular to two given lines; condition of intersection; a quadric surface; conjugate axes and planes; classes of quadrics: tangent and polar lines, and planes to a quadric: surfaces derived from generating curves: the equations of the helix; the conoid. *Newcomb's Analytical Geometry. Winter term, full study.* Professor SHATTUCK.

Required: Math. 2, 4, 6, 7.

9. INTEGRAL CALCULUS.—Elementary forms of integration; integrals immediately reducible to the elementary forms: integration by rational transformations; integration of irrational algebraic differentials: integration of transcendent functions: definite integrals; successive integration: differentiation under the sign of integration; integration by means of differentiating known integrals; double integrals; triple and multiple integrals; product of two definite integrals.

Rectification and quadrature; the parabola, the ellipse, the cycloid, the Archimedean spiral, the logarithmic spiral, the limniscate, the cycloid, quadrature of surfaces of revolution and of surfaces in general; cubature of volumes: the sphere, the pyramid, the ellipsoid, any solid of revolution, and of volumes in general. *Newcomb's Differential and Integral Calculus. Spring term, full study.* Professor SHATTUCK.

Required: Math. 2, 4, 6, 7, 8.

10. THEORY OF EQUATIONS.—The development of the general properties of equations: relations of the roots and the coefficients of an equation, with applications to symmetric functions; transformation of equations; solution of reciprocal and binomial equations; algebraic solution of cubics and biquadratics; properties of derived functions: the limits and separation of the roots of equations; the solution of numerical equations of the nth degree. *Burnside and Panton's Theory of Equations. Fall term, full study.* Assistant Professor TOWNSEND.

Required: Mat. 2, 4.

11. THEORY OF DETERMINANTS.—It is designed to give the student a thorough working knowledge of the subject and of its applications. It will, in general, cover the origin and notation

of determinants, properties of determinants, determinant minors, multiplication of determinants, determinants of compound systems, determinants of special forms—Jacobians, Hessians, Wronskians—with applications to algebra including linear transformations, and to analytic geometry. *Weld's Theory of Determinants* with selected chapters from *Scott's Theory of Determinants*. *Winter term, full study.* Assistant Professor TOWNSEND.

Required: Mathematics 2, 4, 6, 7.

12. THEORY OF INVARIANTS.—The course will cover the general development of the theory of invariants from both the geometric and the algebraic side. Applications of invariants will be made to systems of conics and to higher plane curves. *Bruno's Binären Formen* will be followed in part, but frequent use will be made of *Clebsch's Geometrie*. *Spring term, full study.* Assistant Professor TOWNSEND.

Required: Math. 7, 10, 11.

13. THEORY OF FUNCTIONS.—By way of introduction, considerable attention will be given to the geometric representation of the complex variable, including Argand's diagram, conformal representation, and harmonic ratios, and bilinear transformation. This will be followed by the development of the theory of infinite series, algebraic and transcendental functions, integration of uniform functions, Riemann's surfaces, and so much of elliptic functions as the time will permit. *Harkness and Morley's Theory of Functions. Fall term, full study.* Assistant Professor TOWNSEND.

Required: Math. 8, 9, 12.

14. METHOD OF LEAST SQUARES.—The object of this course is to present the fundamental principles of the subject in a manner so plain as to render them intelligible and useful to students of astronomy and engineering. The following subjects will be studied: Law of probability and error, adjustment of observations, precision of observations, independent and conditioned observations, etc. *Merriman's Least Squares. Fall term, three hours per week. This, with Astronomy 3 two hours per week, makes a full study.* Assistant Professor MYERS.

Required: Mathematics 7, 8, 9.

15. SEMINARY AND THESIS.—*Fall, winter, and spring terms, two-fifths study.*

16. DIFFERENTIAL EQUATIONS.—This subject is designed for students in the courses of engineering and mathematics and

astronomy. It will embrace the following topics: General linear equations with constant coefficients, special forms of differential equations of higher order, integration of series, etc. *A. R. Forsyth's Differential equations. Winter and spring terms, three hours per week. This, with Astronomy 3 of winter and spring terms, constitutes a full study.* Assistant Professor MYERS.

Required: Math. 7, 8, 9.

17. ANALYTIC GEOMETRY OF SPACE.—A general review will be given of the position of the plane and the right line in space and the more general properties of surfaces of the second degree. To this will be added the classification of quadrics, special properties of quadrics, foci and confocal surfaces, general theory of surfaces, curves and developables, families of surfaces, and surfaces of higher orders. *Charles Smith's Solid Geometry, with references to Salmon's Geometry of three Dimensions. Winter term, full study.* Assistant Professor TOWNSEND.

Required: Math. 7, 8, 11.

18. HIGHER PLANE CURVES.—The course is designed to cover the general properties of Algebraic curves, including the theory of multiple points and tangents, curve tracing, poles and polars, and reciprocal curves; to which will be added envelopes, cubics and quadrics, transcendental curves, transformation of curves, and the general theory of curves. *Salmon's Higher Plane Curves. Spring term, full study.* Assistant Professor TOWNSEND.

Required: Math. 8, 9, 12.

19. SOLID AND SPHERICAL GEOMETRY.—This is the course prescribed for the students in the College of Literature and Arts. *Spring term, full study.* Mr. MOGENSON.

MECHANICAL ENGINEERING.

1. SHOP PRACTICE.—In the shops the students are advanced in the work as fast as their ability will permit. The work, as far as possible, is carried along the same lines as those practiced in our leading commercial shops. The exercises are in general chosen from parts of machies under construction, being carefully graded according to the skill of the student. The policy of the department is to give the student every possible advantage and to teach him to produce accurate work in the shortest possible time.

Beginning with the care and use of the tools with which he is to work, the student is carried through the various operations

of machine shop practice. The following outlines the work in the several shops as laid down for the regular classes, the work of the several terms being subject to transposition.

First Term, Wood Shop.—Primary exercises relating to the use and care of tools, and the construction of a series of exercises in joint work and turning preparatory to pattern making.

Second Term, Wood Shop.—The work of this term is devoted largely to the making of patterns and core boxes, particular attention being given to the principles of molding.

Third Term, Foundry.—The student here receives instruction in the management of the cupola and molding, including green and dry sand core making. *Fall, winter, and spring terms, full study.* Mr. CURTISS and Mr. BRODE.

2. SHOP PRACTICE.—First Term, Forge Shop.—Instruction is given in the forging and welding of iron and steel, special attention being given to the forging and tempering of lathe and planer tools, annealing, and case hardening.

Second Term, Machine Shop.—During this term the student receives instruction in chipping, filing, and elementary lathe and planer work.

Third Term, Machine Shop.—Lathe, planer, drill, shaper, or bench work. *Fall, winter, and spring terms, half study.* Mr. CLARK and Mr. JONES.

3. SHOP PRACTICE AND LABORATORY.—First Term, Machine Shop.—Lathe, planer, milling machine, grinding machine, or bench work.

Second Term, Machine Shop.—Advanced work on any of the machines in the shop, or erecting and fitting. *Fall and winter terms, half study.* Assistant Professor VANDERVOORT, Mr. CLARK, Mr. CURTISS, and Mr. JONES.

Third Term.—Mechanical Engineering Laboratory.—This is the beginning of the work in the mechanical engineering laboratory and this course is designed to meet the needs of the student in electrical engineering and to acquaint him with the various instruments and methods used in engine and boiler testing. Considerable work is done with the indicator and a study of diagrams obtained under different conditions is undertaken. *Spring term, half study.* Professor BRECKENRIDGE and Mr. BURNHAM.

Required: Mechanical Engineering 1, 2, 5, 6.

4. ELEMENTS OF MACHINE DESIGN.—The basis of this work is found in *Klein's Elements of Machine Design.* A series of plates

26x40 inches is constructed, covering a wide range of machine parts. There are 334 formulas, empirical and rational, the use and derivation of which are explained. By means of a large number of practical examples, sufficient drill is obtained in using them to enable the student to make the calculations required when designing such parts of machines as screw threads, nuts and bolts, rivets and riveted joints, keys, connecting rod ends, belts, pulleys, stepped cones, shafts, end and neck journals, pivots, and bearings for rotating pieces. Problems relating to gearing are taken up, such as exact and approximate methods of laying out profiles of teeth, proportions of teeth for strength and durability; circular and diametral pitch: cast and cut gears; sizing of blanks; gear cutters: wooden teeth: spur, bevel, and worm gearing, and proportions of worm gearing for highest efficiency. *Fall, winter, and spring terms, half study.* Mr. BURNHAM.

Required: General Engineering Drawing 1, 2, 3, 4.

5. MECHANISM.—A study of the nature and equivalence of mechanisms. Determination of centrodes. Graphical diagrams of the paths, speeds, and accelerations of important points of familiar mechanisms. Laying out of cams. Analysis of difficult mechanisms. Determination of velocity ratios. Particular attention is paid to problems relating to motions of gearing, steam engine mechanisms, parallel motions of indicators, governors, link motions, valve gears, and indicator riggings. *Full term, full study.* Mr. WOOD.

Required: Math. 2, 4, 6; Mechanical Engineering 1, 2, 4.

6. STEAM ENGINES AND BOILERS.—A study of the details of modern engines and boilers and of the principles involved in their construction and operation. Text books used are: *The Steam Engine*, *Holmes*, and *A Treatise on Steam Boilers*, *Wilson-Flather*. *Winter term, full study.* Assistant Professor VANDERVOORT.

Required: Math. 2, 4, 6; Theoretical and Applied Mechanics 1.

7. THERMODYNAMICS.—The fundamental principles underlying the transformation of heat into work, more especially as exemplified in the steam engine, are carefully studied. Considerable attention is paid to the solution of numerous examples, such as will arise in steam, air, or gas engineering, as well as drill in the rapid and accurate use of standard steam tables. *Fall term, full study.* Professor BRECKENRIDGE.

Required: Math. 7, 8, 9; Theoretical and Applied Mechanics 1; Physics 1, 3.

8. MECHANICS OF MACHINERY.—This is a study of the theoretical principles involved in the construction of such machinery as comes under the head of hoisting apparatus, pumping engines, air compressors, fans, blowers, machinery for transmitting power, locomotives, pile drivers. *Winter and spring terms, full study.* Mr. BURNHAM.

Required: Math. 7, 8, 9; Theoretical and Applied Mechanics 1, 2, 3; Mechanical Engineering 5, 6, 7, 11.

9. MACHINE DESIGN.—This work follows the design of a high-speed steam engine, and comes under two heads:

Advanced Design.—Under this head the work begins with simple machines and extends to more difficult designs as the student progresses. The design of attachments to existing machines, or the complete design of some machine that can be built in the shops, is often a part of this work. Such designs as hoists, pumps, drills, lathes, shapers, water motors, etc., are undertaken and the student is supplied with the same information as he would be in commercial offices for this kind of work.

Original Designs.—In this work the student's previous training in designing is combined with his inventive ability, and often valuable and ingenious work is done. The machines are to be designed for accomplishing a certain prescribed work. Often but a single piece is handed the student, and a machine is required to produce a given number of these pieces per hour.

A large amount of study of existing machines is required. The student is taught to consult the standard works on designing, such as *Unwin, Reuleaux, Klein, Marks, Richards,* and to use such pocket books as *Nystrom, Haswell, Taschenbuch der Hütte,* etc. *Winter and spring terms, full study.* Mr. WOOD.

Required; Math. 7, 8, 9; Theoretical and Applied Mechanics 1, 2, 3; Mechanical Engineering 1 to 8, and 11.

10. ESTIMATES.—Calculations and estimates are made as to the cost of machinery, power, plants, boilers, chimneys, systems of piping, engines and their foundations, different methods of power transmission.

Also forms of contracts and specifications are studied. *Spring term, full study.* Assistant Professor VANDERVOORT.

Required: Math. 7, 8, 9; Theoretical and Applied Mechanics 1, 2, 3; Mechanical Engineering 1 to 6, 9, 11, 12.

11. VALVE GEARS AND STEAM ENGINE DESIGN.—Under this head the steam engine is carefully studied in all its details. A series of plates is drawn showing for the minimum, average, and maximum horse power the pressure of steam on the piston at all points of the stroke, the pressure at cross head, crank pin, crank shaft at all crank angles; taking into account the forces of inertia combined with the steam pressures—counterbalancing crank disc, weight of fly wheel. Each part of a complete engine is designed, and detailed drawings made and traced so that each member of the class may have a complete set of blue prints.

The work in valve gears will be done partly by recitations and partly by drawing room work. The application of graphical diagrams as an aid in the study and design of valves for engines is carefully brought out. *Fall term, full study.* Assistant Professor VANDERVOORT.

Required: Math. 7, 8, 9: Theoretical and Applied Mechanics 1, 2; Mechanical Engineering 1 to 7.

12. MECHANICAL ENGINEERING LABORATORY.—This work is a continuation of the work begun during the last term of the junior year. It consists of a study of such instruments as are found in the mechanical engineering laboratory, methods of using and calibrating scales, thermometers, gauges, indicator springs, planimeters, counters, calorimeters, brakes, etc. Experiments are made with engines, pumps, injectors, boilers, motors, etc., to determine under what conditions they may be expected to give a maximum efficiency. A limited amount of commercial testing may be undertaken. Tests of plants in the vicinity are made a feature of this work. Carefully prepared reports are always required. Special investigations and research are undertaken as far as possible. *Fall and winter, full study.* Professor BRECKENRIDGE and Mr. BURNHAM.

Required: Math. 7, 8, 9: Theoretical and Applied Mechanics 1, 2, 3; Mechanical Engineering 1 to 7, 11.

MECHANICS, THEORETICAL AND APPLIED.

1. ANALYTICAL MECHANICS.—The mechanics of engineering, rather than that of astronomy and physics, is here considered, with a view to the future needs of the student of engineering. In addition to fixing the fundamental concepts and

demonstrating the general principles of equilibrium and motion, application of principles and methods is made to numerous and varied engineering problems in such a way that the student must discriminate in the use of data and in the statement of conditions, and so obtain a working knowledge of the subject. The methods of the calculus are used whenever preferable. As mathematical processes and forms express most readily and quickly the rules and methods of work, the training in this direction is important. This subject requires a thorough working knowledge of the mathematics preceding it in the course.

Outline of the subject: Nature and measure of force; composition and resolution of forces; moments; conditions of equilibrium; resultant of systems of forces; center of gravity; moment of inertia; rectilinear and curvilinear motion, and the relation between such motion and the constraining and accelerating forces; dynamics of a rigid body; momentum and impact; work, energy, and power; mechanical advantage; friction. *Bowser's Analytical Mechanics. Fall term, full study.* Professor TALBOT.

Required: Math. 2, 4, 6, 7, 8, 9.

2. RESISTANCE OF MATERIALS.—In the treatment of this subject it is the aim to give the student a thorough training in the elementary principles of the mechanics of materials, to follow with such experiments and investigations in the testing laboratory as tend to verify the experimental laws, and to add such problems in ordinary engineering practice as will train the student in the use of his knowledge. Attention is also given to the quality and requirements for structural materials.

Outline of the subject: Elasticity of materials: stresses and strains; experimental laws: working strength for different materials: resistance of pipes and riveted joints; bending and resisting moment; shear and elastic curve of cantilever, simple, restrained, and continuous beams; column formulas; torsion, and shafts; maximum internal stresses in beams; fatigue of metals; working strength for repeated stresses; resilience; reliability of the common theory of flexure, as shown by actual experiment; design and strength of rolled and built beams and columns; specifications for materials and methods of testing. *Merriman's Mechanics of Materials. Winter term, full study.* Professor TALBOT.

Required: Math. 2, 4, 6, 7, 8, 9; Theoretical and Applied Mechanics 1.

3. HYDRAULICS.—In hydraulics the instruction is by text book and laboratory work. The laws of the pressure and flow of water and its utilization as motive power are considered. Experimental work in the hydraulic laboratory gives training in the observation and measurement of pressure, velocity, and flow, and in the determination of experimental coefficients.

The subject covers the following: Weight and pressure of water; head; center of pressure: velocity and discharge through orifices, weirs, tubes, nozzles, pipes, conduits, canals, and rivers; measurement of pressure, velocity, and discharge: meters and measurements: motors, turbines, and water wheels: water power and transmission of power. *Merriman's Hydraulics. Spring term, full study.* Professor TALBOT.

Required: Math. 2, 4, 6, 7, 8, 9; Theoretical and Applied Mechanics 1, 2.

4. APPLIED MECHANICS.—To be taken instead of Analytical Mechanics. The course of study and topics studied will be nearly identical. *Peck's Elementary Mechanics. Full term, full study.* Assistant Professor MYERS.

Required: Mathematics, 2, 4, 6.

5. STRENGTH OF MATERIALS.—To be taken instead of Resistance of Materials. The course of study will be nearly the same, though somewhat simplified. *Merriman's Mechanics of Materials. Winter term, full study.* Assistant Professor MYERS.

Required: Mathematics, 2, 4, 6: Theoretical and Applied Mechanics 4.

METEOROLOGY.

1. METEOROLOGY.—The study of those atmospheric movements which bring our changes of weather, with their relations to heat, cold, electrical conditions, wind, cloud, barometric pressure, etc., constitutes the work of the first half of the fall term. Abercrombie's Weather is used as an introductory text book: but most of the instruction is given by lectures, the study of charts, and attempts by the student to forecast weather changes. *Full term, two fifths study.* Professor ROLFE.

Required: Chemistry 3b; Physics 1 or 2.

MILITARY SCIENCE.

1. DRILL REGULATIONS.—For all male students. First term: school of soldier; bayonet exercise; second term: school of com-

pany, close and extended order. *Fall and winter terms, one-fifth study.* Professor BRUSH.

2. PRACTICAL INSTRUCTION IN SCHOOL OF SOLDIER.—Company and battalion in close and extended order; school of the cannoneer and of the battery dismounted; target practice. Freshman and sophomore years; *six terms, counts one and three-fifths studies.* Professor BRUSH.

3. RECITATIONS AND PRACTICE FOR OFFICERS. NON-COMMISSIONED OFFICERS.—*Sophomore year:* School of the battalion, close and extended order; ceremonies; review and inspection: military signaling; guard, outpost, and picket duty. *Junior year:* military administration; reports and returns; theory of fire arms, and target practice; organization of armies; field fortifications; art of war. *Seven terms, recitations 1 to 2 hours a week; drill 2 hours a week.* Professor BRUSH. This course is obligatory upon officers and non-commissioned officers, and open to others.

MINERALOGY.

1. ELEMENTS OF MINERALOGY.—The first term's work is intended to be a general introduction to the subject. Instruction is given both by lectures and in the laboratory. In the lectures, which occur on specified days (2 or 3) each week, such subjects as follow are discussed: genesis of minerals; conditions favoring their deposition; origin of the massive and crystalline forms; relationships of minerals, and their classification: the physical properties of minerals; as color, luster, hardness, gravity, streak, etc., with the conditions which may cause these properties to vary; elements of crystallography, etc.

In the laboratory the student is first made acquainted with the simplest trustworthy methods for proving the presence or absence of the acids and bases. He is then required to determine a large number of species by their physical and chemical properties only. *Fall term.* Professor ROLFE and Mr. MOSIER.

Required: Chemistry 1.

2. CRYSTALLOGRAPHIC MINERALOGY.—(*a*) During the second term a careful study of the forms of crystals is made, including the measurement of angles and determination of complex forms. The student is also required to identify many species of minerals by their crystalline forms, and to verify his conclusions by the methods in use during the preceding term.

(*b*) Optical Mineralogy—The work of the third term will be devoted to the microsopic determination of rock forming minerals; to the methods for separating the mineral constituents of fine grained rocks, etc., etc. *Winter and spring terms, full study.* Professor ROLFE.

Required: Mineralogy 1.

MUNICIPAL AND SANITARY ENGINEERING.

1. ROAD ENGINEERING.—Instruction is given by means of text books and lectures. In country highways the value and importance of road improvement and the best means of securing it are considered, together with the principles and details of construction of earth, gravel, and macadam roads. In city streets, the methods of construction, cost, durability, and desirability of the various kinds of pavement, and the question of grades, cross sections, methods of assessment of cost, and methods of maintenance and cleaning are treated. *Lectures and Reading. Winter term, with Civil Engineering 4, makes a full study.* Assistant Professor PENCE.

Required: Math. 4: General Engineering Drawing 1, 2: Civil Engineering 1, 2, 3, 4.

2. WATER SUPPLY ENGINEERING.—This subject is intended to cover the principal features of the construction of water works, including the tests and standards of purity of potable water; the choice of source of supply; the designing of the distribution system, pumps and pumping machinery, reservoirs, stand-pipes, and the filtration of water. *Lectures; Fanning's Water Supply Engineering. Fall term, full study.* Professor TALBOT.

Required: Theoretical and Applied Mechanics 1, 3; Chemistry 1; Mechanical Engineering 6.

3. SEWERAGE.—The design and methods of construction of sewerage systems for cities, including the following: Sanitary necessity of sewerage: water carriage systems, both separate and combined; surveys and general plans; hydraulics of sewers; relation of rainfall to storm water flow, and determination of size and capacity of sewers; house sewage and its removal; form, size, design, and construction of sewers and sewer appurtenances; modern methods of sewage disposal by filtration, chemical precipitation, irrigation, etc., with resultant changes in the sewage; garbage disposal; general sanitation; estimates

and specifications. *Lectures; Staley and Pierson's Separate System of Sewerage. Winter term, full study.* Professor TALBOT.

Required: Theoretical and Applied Mechanics 1, 3; Chemistry 1.

4. BOTANY.—This is a study of the lowest orders of plants, including such species as are most commonly met with in microscopical examinations of water, and found associated with putrescent substances. Lectures or recitations and microscopical laboratory work. This is practically the same as the first part of the second term of Botany 1, in College of Science. *Winter term, half study.* Professor BURRILL.

5. BACTERIOLOGY.—For students in course in municipal engineering. This course includes the identification and classification of bacteria, and of allied organisms, their relations to health and to disease, the methods of separation and cultivation, and the methods of air and water analysis. The laboratory is furnished with sterilizers, culture ovens, microscopes, etc., and students have abundant opportunity to do practical work. This is at first the same as Bacteriology 1, in the College of Science, but in the latter part of the term special investigations are undertaken by the engineering students. *Fall term, full study.* Professor BURRILL.

Required: Municipal and Sanitary Engineering 4.

MUSIC.

1. HISTORY OF MUSIC.—The purpose of this course is to impart a thorough knowledge of music from the early Greek ages to the present time, including the rise of dramatic music, the beginning and progress of oratorio, the growth and development of instrumental music, and an outline of the lives of the composers.

2. THEORY OF MUSIC.—The course in theory includes elementary instruction in acoustics and tone quality, accent (natural and artificial), rhythm and tempo; orchestral instruments, their special characteristics and the more easily recognized effects. Special attention is paid to the interpretation of music, both as to its rendition and significance, and to musical forms. Harmony is studied, beginning with preparatory work in tonality, intervals and inversions, and going on through figuration accompaniments and the smaller forms. The ele-

ments of counterpoint, also, receive sufficient attention to give the student a general understanding of the nature of the subject.

PEDAGOGY.

1. DIDACTICS.—In pedagogy of university grade, the study of general pedagogy and of the methodology of specific branches can not be dissociated. General principles require to be illustrated by specific examples. On the other hand, specific methods can not be understood without general principles. Therefore, the whole subject is comprised in didactics. In order to preserve unity in the work, the general subject is expounded upon the basis of lectures on six of the minor works of Herbart, which are thus far inaccessible in translation. The works to be read and discussed by each student are assigned with specific reference to his future aims. *Fall and winter terms, full study.* Professor ECKOFF.

2. SYSTEMATICS.—A full exposition of the system of Herbart on the two-fold basis of that thinker's General Pedagogy and Outlines of Pedagogic Lectures will be presented. The former is accessible in translation. It, substantially, will constitute the text work. The contents of the Outlines being added in lectures will complement this text work. *Fall and winter terms, three-fifths study.* Professor ECKOFF.

3. SCHOOL GOVERNMENT AND SUPERINTENDENCY.—The following topics falling under this course will suffice to indicate its necessarily composite character.—School Law. How Not to Expel a Pupil. Teachers' Meetings and Conventions. Superintendents' Reports. The Teacher's Relation to the Public Press. Plotting an Attendance Curve.—Much attention will be given in this course to the expression of pedagogic thought in speech and writing. *Spring term, full study.* Professor ECKOFF.

4. THE PEDAGOGY OF THE NATURAL SCIENCES.—With the general object of showing the necessity and value of scientific knowledge and training both for public education and for individual culture, and with the specific object of equipping science teachers for institutions of high-school grade and superintendents for properly supervising science work in lower grades where it is committed to their care, the department of pedagogy offers a course in the Pedagogy of the Natural Sciences. The

course will be closely aligned both in time and in the pedagogical treatment of the topics with the development of the student's work in the sciences he has elected. Every student will begin his course by being thoroughly grounded in Herbert Spencer's Education, especially in the chapters on "What Knowledge is of the Most Worth," and on "Intellectual Education." Immediately afterwards he will enter upon the study of the best methods of introducing, presenting, and enlarging scientific work, including a study of the comparative value of scientific text books, and a training for representing the claims of science work before boards and conventions and in the educational press. This training will include a study of science teaching in Illinois, its progress, and the obstacles to it. In offering this course, the department is assisted by a loan collection of books upon the pedagogy of the natural sciences from the shelves of the zoölogical department. *Fall term, full study.* Professor ECKOFF.

5. HISTORY AND CLASSICS.— In pedagogy of university grade, the study of educational history and of educational classics can not be dissociated. No great writer can be understood except in his historical environment. On the other hand, educational history is the history of ideas. These ideas are set forth in the great writers on education. Students are advised to take this course in the sophomore year. The classics will be read by the students themselves; the connective history will be delivered in lectures. *Fall and winter terms, full study.* Professor ECKOFF.

6. LATIN PEDAGOGY.—By concurrence with the Latin department, the department of pedagogy offers a course on the pedagogy of Quintilian. *Fall term, three-fifths study.* Professor ECKOFF.

Required: Latin 10, antecedently or concurrently.

7. SPENCER'S SYNTHETIC PHILOSOPHY.—The more difficult or critical parts of Herbert Spencer's philosophy will be treated in lectures. Those portions which are more closely allied with particular sciences will be read, each by students in the respective science treated. The results of these readings will be compared, discussed, and united, both among themselves and with the results of the lectures at a seminary. *Winter and spring terms, full study.* Professor ECKOFF.

Required: 20 university credits.

PHARMACY.

1. PHARMACY.—This course is intended to serve as an introduction to the theory and practice of pharmacy.

Instruction consists of lectures and text-book work, with recitations upon the history of pharmacopœias, weights and measures, specific gravity, and the general operative methods of pharmacy, problems in calculating formulas in parts by weights and percentage strengths, chemical proportions, etc. *Remington's Practice of Pharmacy. Full term, full study.* Mr. SANDFORD.

2. PHARMACEUTICAL PREPARATIONS.—This work consists of practice in manufacturing samples of the various official and unofficial preparations.

The student is not required to prepare a great number of each class, but as it is necessary to have sufficient practice to become expert in the manipulation involved, he is directed to make as many as will accomplish that end. Satisfactory work is required on over one hundred preparations. When this work is completed, it is thought that the field of manufacturing pharmacy will have been sufficiently covered to give the student a solid foundation for his future work.

Accompanying the laboratory work is a study of all the official and the important unofficial preparations, recitations from text books, lectures and laboratory work. *U. S. Pharmacopœia; National Formulary; U. S. and National Dispensatories. Winter and spring terms, full study.* Mr. SANDFORD.

Required: Chem. 1; Pharmacy 1.

3. PHARMACOGNOSY.—This course is intended to make the student thoroughly acquainted with the chemicals and drugs found in the pharmacy and used by the medical profession. The work begins with comparative studies of the salts, etc., used in medicine and of the methods of readily distinguishing between chemicals of like appearance, at the same time their physiological action, dose, sources, and methods of manufacture are considered in a general way. Following this, the organic materia medica is taken up. A complete study of the animal and vegetable drugs, including a close study of the pharmacopœial, English, and common names. By continued practice at the desks the student becomes familiar with all the roots, leaves, seeds, barks, etc., in use, and by the aid of a lens and pocket knife should be able to recognize any of the substances

employed in the practice of pharmacy. *Maisch's Organic Materia Medica; U. S. Pharmacopœia. Fall term, first year, full study; spring term, second year, full study.* Mr. SANDFORD.

4. PHARMACEUTICAL TECHNOLOGY.—The sources, manufacture, uses, etc., of the inorganic and organic substances used in pharmacy. Impurities and the means of detecting them. Official standards of purity and strength. Prescription reading and practice. The latinity of prescriptions, study of incompatibilities and rules for dispensing.

Finally a general review of the two year's work in pharmacy to serve in part as a preparation for the examination required by the State Board of Pharmacy for registration as pharmacists. *U. S. and National Dispensatories; U. S. Pharmacopœia; Remington's Practice of Pharmacy. Fall and winter terms, full study.* Mr. SANDFORD.

5. PHARMACEUTICAL ASSAYING.—One term's work, mainly devoted to proximate analysis of organic compounds and mixtures of natural occurrence or of other origin. The work is both qualitative and quantitative, and includes determinations of the more important alkaloids, carbohydrates, acids, and other essential constituents of organic substances. *Dragendorf's Plant Analysis; Prescott's Organic Analysis; Allen's Commercial Organic Analysis; Lyon's Pharmaceutical Assaying. Spring term, full study.* Mr. SANDFORD.

Required: Chemistry 4.

6. PHARMACEUTICAL BOTANY.—See Botany 7.

PHILOSOPHY.

1. OUTLINES OF PHILOSOPHY.—This course is offered for the benefit of students who have but a single term for the study of philosophy. It is designed primarily to meet the wants of science students who desire some knowledge of the subject. To this end, the most important problems in philosophy, including metaphysics, are presented. Lectures and prescribed reading. *Fall term, full study.* Dr. DANIELS.

2. ANCIENT AND MEDIÆVAL PHILOSOPHY.—A rapid survey is taken of the development of speculative thought, beginning with the early Greek philosophers and continuing through the mediæval period. *Winter term, three-fifths study.* Dr. DANIELS.

3. MODERN PHILOSOPHY.—This course considers the formal tion and development of the problems and conceptions in phi-

losophy from Descartes to the present time. Selections from the philosophical masterpieces of this period are carefully studied. Special emphasis is laid upon the philosophy of Kant. *Spring term, full study.* Dr. DANIELS.

4. METAPHYSICS.—This course has two objects. A somewhat critical and thorough study of subjects of special prominence in philosophy, *e. g.*, realism, idealism, and theory of knowledge. No text book is used. Topics are assigned and papers, prepared by the students, are read and discussed in the class.

To promote acquaintance with current philosophical thought various articles on different aspects or problems of modern philosophy are read and criticised. *Winter term, two-fifths study.* Dr. DANIELS.

5. ADVANCED PHILOSOPHY.—The work consists in a critical study of *Lotze's Microcosmus*, together with supplementary readings and discussions upon suggested topics. The course is designed for somewhat advanced students and is open to those who have received at least two credits in philosophy or have done an equivalent amount of work in this department. *Full and winter terms, full study.* Dr. DANIELS.

Required: Philosophy 2, 3, 4, or their equivalents.

6. PRACTICAL ETHICS.—In this course those questions which bear the closest relation to life and conduct are raised and discussed. The duties of the individual, the family, and the state are among the subjects considered. Special subjects in social ethics may be taken up, including the duties of society to the unfortunate and delinquent classes. *Spring term, two-fifths study.* Dr. DANIELS.

7. HISTORY AND CRITICISM OF ETHICAL THEORIES.—A careful and historical examination of the various types of ethical theory, including rational, hedonistic, eudemonistic, esthetic, and evolutional ethics. It is designed to make the student as familiar as the time allows with the writings of representative men of the various schools. *Spring term, three-fifths study.* Dr. DANIELS.

8. LOGIC.—This course aims to give a knowledge of the principles of deductive and inductive reasoning. Special attention is given to fallacies and to the problems, grounds, and principles of induction. The study is designed not only to direct the student in practical reasoning and correct thinking, but also to familiarize him with the principles and methods of scientific investigation. *Spring term, full study.* Dr. DANIELS

PHYSICAL CULTURE FOR WOMEN.

1. This course furnishes a liberal education of the body according to modern scientific methods. Each student comes under the personal observation of the instructor and is graded for work according to her physical condition. Special attention is given to defects of bodily carriage and movement, and prescriptions of exercise are given for the correction of round shoulders, uneven hips, drooping heads. The training has for its fundamental aims, health, strength, muscular flexibility and grace. It is divided into practical and esthetic work, and includes German, French, and Swedish exercises. The Delsarte culture is studied after the practical gymnastic drill is acquired. It is thoroughly taught as the higher use of the muscles, and includes artistic principles in the management of the body.

An outline of two year's work is as follows: Free hand gymnastics, light gymnastics, the Day's Order, Nine Laws of Ling, plain and fancy marching, dumb bells, Indian clubs, fencing and apparatus work, Delsarte culture, studies in expression and attitude, pantomime.

Every woman student, not physically disqualified, may take this gymnastic drill three times a week for three or six terms. For this work, satisfactorily performed, together with the lecture in Hygiene (Phys. Cult. 2), one credit or two credits, respectively, are allowed toward graduation from any university course. All students who elect this work, must first be measured and examined, with a view to determining whether they are in fit physical condition to take the course. *Six terms, two-fifths study.* Miss KELLOGG.

For those among the regular students who are not capable of the physical effort required to make the term credit, a voluntary class will be opened where the students will be given individual work to bring the strength up to the normal, and when sufficient progress is made, entrance to the regular classes may be obtained by satisfying the instructor that all preparatory requirements have been filled.

2. A course designed to impart a knowledge of the conditions most favorable to bodily health and activity, of the principles underlying the hygienic treatment of common weaknesses and abnormalities, and of the avoidable causes of the more frequent diseases. Among the more important subjects treated may be named the theory of bodily exercise, ventilation and

heating, the composition and relative nutrient value of foods, and the causes and methods of communication of contagious diseases. The course deals with those practical hygienic problems of every-day life that are wholly or in large part under the control of each individual.

The course is prescribed for young women who take physical culture for credit. It necessitates a knowledge of elementary physiology, and this subject may, therefore, well be one of those chosen for examination for entrance. *Fall and winter terms, one-fifth study.* Assistant Professor SUMMERS.

PHYSICS.

1. GENERAL DESCRIPTIVE PHYSICS.—Lectures. This course is designed for those who wish to gain a knowledge of the more important laws and phenomena of physical science, and of the means for exhibiting, studying, and applying such laws and phenomena. It is prescribed for the students in the College of Engineering. *Three times a week. Fall, winter, and spring terms, two-fifths study.* Professor SHEA.

Required: Math. 3 or 4.

2. ELEMENTARY PHYSICAL MEASUREMENTS.—Lectures and Laboratory. This course is designed for those who wish to become acquainted with the simple methods only for the qualitative and quantitative study of physical phenomena. Lectures twice a week; laboratory, three periods of 3 hours each week. *Winter term, full study.* Professor SHEA.

3. ADVANCED PHYSICAL MEASUREMENTS.—Laboratory. This course is designed for those who wish to study quantitatively by the aid of the more accurate scientific methods the chief laws and phenomena of physical science. It is prescribed for students in the College of Engineering, and must be taken by them in same year with Physics 1. *Once a week. Fall, winter, and spring terms, three-fifths study.* Professor SHEA and Mr. SAGER.

Required: Math. 3 or 4.

4. ADVANCED ELECTRICAL MEASUREMENTS.—Lectures and Laboratory. This course is a discussion of the theory of electricity, particularly with respect to electrical units, and electrical measuring instruments, together with laboratory work in advanced problems in electrical measurements. It is prescribed for students in electrical engineering. *Fall and winter terms, full study.* Professor SHEA, Mr. ESTY, and Mr. SWENSON.

Required: Physics 1 and 3; Math. 7, 8, 9.

5. Mathematical Theory of Electricity and Magnetism.—A general treatment of electrostatics, electro-dynamics, magnetism, and electro-magnetism. *Fall, winter, and spring terms, full study.* Professor Shea.

Required: Physics 1 and 3; Math. 7, 8, 9.

6. Mathematical Theory of Dynamics, Heat, Light, or Sound.—A general treatment of the more important problems of dynamics, heat, light, or sound. *Fall, winter, and spring terms, full study.* Professor Shea.

Required: Physics 1, 3; Math. 7, 8, 9.

7. Advanced Measurements in Dynamics, Heat, Light, and Sound.—Laboratory. *Fall, winter, and spring terms, full study.* Professor Shea and Mr. Sager.

Required: Physics 6.

8. Original Research.— Laboratory. *Fall, winter, and spring terms, full study.* Professor Shea.

Required: Physics 6, 7.

THEORETICAL AND APPLIED MECHANICS.

See Mechanics, Theoretical and Applied.

PHYSIOLOGY (*Human*).

1. Major Course.—Taking as a basis the knowledge of the structure and physiology of mammals obtained in Zoölogy 1 or 3, there is made a systematic study of the differences, so far as they are of physiological import, between the anatomy of man and of the type mammal there studied; a more detailed study of the facts and methods of mammalian histology; and finally with as much fullness as the time will permit, a study of the special physiology of man. In the laboratory work the topics are selected to illustrate so far as possible the different methods of obtaining physiological data. *Winter and spring terms, full study.* Assistant Professor Summers.

Required: Chemistry 4; Zoölogy 3.

2. Advanced Physiology.—The first term is devoted to a study of the physiology of foods, digestion, and excretion, illustrating the application of chemical principles and methods to physiological research. The second term is given to a study of the blood, the circulation, and respiration. This involves principally the application of physical methods, and practice in the

use of instruments of precision. The third term is occupied with a study of the general physiology of muscle, and the special anatomy and physiology of the nervous system. *Fall, winter, and spring terms, full study.* Assistant Professor SUMMERS.

Required: Physiology 1: Physics 1.

3. INVESTIGATION AND THESIS.—An opportunity for original investigation, upon which may be founded the graduating thesis, is offered to students in their senior year. While the instructor will have a general supervision of this work, it is expected that the student will at all times take the initiative, seeking only such information and advice as he would ask of any coworker in his department of science. *Winter and spring terms, full study.* Assistant Professor SUMMERS.

Required: Physiology 1, 2.

4. MINOR COURSE.—This course is planned for literary students and for students of natural science specializing in other lines. While some attention is paid to all the important processes of the body, especial emphasis is laid upon those facts that serve as a basis for practical hygiene. *Full term, full study.* Assistant Professor SUMMERS.

Required: Chemistry 1.

PSYCHOLOGY.

1. GENERAL PSYCHOLOGY.—In this general course are considered the more general problems of the mental life of the normal individual, especially those that have a living interest for the student, and find illustration in his every day life. Among the large number of topics discussed the following are chief: Relation of mental activity to bodily changes, sensation, habits, attention, memory, imagination, association of ideas, reasoning, instinct, emotion, will, localization of cerebral functions, time relations of mental phenomena. The course is amply illustrated by the use of apparatus, charts, prepared tissue, and photographs. Endeavor is made to give the class the more important results of recent researches, and the course is made to comprise the results of both the introspection and laboratory methods. *Spring term, full study.* Assistant Professor KROHN.

2. LABORATORY PSYCHOLOGY.—This course is made up of lectures and laboratory work, with assigned reading. The class performs a series of about one hundred experiments to illustrate the

time relations of mental processes, the influence of mind and body upon each other, and the psychic factors in sensation. The psychological laboratory of the University is already well equipped with apparatus, to which additions are constantly making. The current literature in this field is discussed in class and made the basis of reports and reviews on the part of the students. *Fall and winter terms, three-fifths study.* Assistant Professor KROHN.

3. COMPARATIVE PSYCHOLOGY.—This course embraces the study of the more elementary mental activities, as manifested in the life of various animals. The object of the course is to trace the development of mind along the animal scale, ranging from the lower forms to the more complex mental phenomena in the conscious life of man. *Romanes and Lloyd-Morgan. Winter term, two-fifths study.* Assistant Professor KROHN.

Required: Psychology 1 or 2 or 9.

4. EDUCATIONAL PSYCHOLOGY.—In this course are discussed the growth and development of the mind, especially with reference to the first years of childhood. The attempt is made to devise methods by means of which the content of a child's mind may be determined at any period of its development. Thus the various methods of testing and training the memory, attention, and other mental powers, will be submitted and employed in actual observations, upon which notes will be made for discussion in class. The order in which the various mental capacities unfold will also form an important theme for study. The course is thoroughly practical in its nature. *Krohn's Practical Lessons in Psychology. Fall term, two-fifths study.* Assistant Professor KROHN.

5. PSYCHOLOGY OF CRIME.—This course consists of a special study of the criminal as a morbid individual in comparison with the normal person. *Spring term, two-fifths study.* Assistant Professor KROHN.

Required: Psychology 1 or 2 or 9.

6. PSYCHOLOGY OF ABNORMAL TYPES.—In this course the following, among other subjects, will be studied: The chief forms of mental diseases or types of insanity, the diseases of memory, the diseases of language, the diseases of will, double personality, peculiar dreams, hallucinations, illusions and delusions. The life of the blind, deaf, and imbecile will be inquired into with a view to determine the best methods of education for these classes. *Winter term, three-fifths study.* Assistant Professor KROHN.

Required: Psychology 1 or 2 or 9.

7. Advanced Experimental Psychology.—Work in this course is arranged for each student individually, and may involve a systematic review of the laboratory methods of some master work in experimental psychology, or it may involve original research. The aim is to give treatment to certain social problems, necessitating original research, and the verification of important features of earlier experiments. *Fall, winter, and spring terms full study.* Assistant Professor Krohn.

Required: Psychology 2.

8. Psychological Seminary.—The subject and hours to be determined after consultation with those who apply. The work in this course is chiefly in the line of discussion of psychological topics and special investigation, as well as reports on the recent psychological literature. All students pursuing major work in this department are required to take an active part in the seminary during their second year. Assistant Professor Krohn.

9. Elementary Psychology.—A course of lectures for the purpose of acquainting the student with the elements of Psychology, with respect to its principal methods and main conclusions. *Winter term, full study.* Assistant Professor Krohn.

RHETORIC.

1. Rhetoric and Themes.—Required for students in the College of Literature and Arts. Three hours a week. *Fall, winter, and spring terms.* The course counts for two credits. Mr. T. A. Clark and Miss Butterfield.

2. Rhetoric and Themes.—Required for students in the Colleges of Agriculture, Science, and Engineering. Three hours a week. *Fall, winter, and spring terms.* The course counts for two credits. Mr. T. A. Clark and Miss Butterfield.

3. Daily Themes.—Higher English Composition. Two hours a week. *Fall, winter, and spring terms, full study.* Mr. T. A. Clark.

Required: Rhetoric 1 or 2.

4. Philosophy of Rhetoric.—This course will be devoted to the critical study of comparative style, and the philosphy of the relation of style to thought. *Winter term, full study.* Mr. T. A. Clark.

Required: Rhetoric 1 or 2.

Oral Rhetoric and Oratory.

1. Oral Rhetoric.—(1) Mechanism of voice, breathing, voice development, pronunciation, modulation, principles of position and gesture. (2) Thought analysis, prepared reading, sight reading. *Fall, winter, and spring terms, three-fifths study.* Miss Kellogg.

2. Oratory.—(1) Melody of speech, grouping, emphasis, rhythm, inflections. (2) Conversation, extempore speech, study of orations, philosophy of expression. *Fall, winter, and spring terms, two-fifths study.*

Required: Oral Rhetoric and Oratory 1.

3. For Students in Colleges of Agriculture, Engineering, and Science.—A special course of one year is offered. It comprises practical training in physical presentation and the management of the voice. Reading from manuscript, memoriter speaking, and extemporaneous addresses. *Fall, winter, and spring terms, one-fifth study.* Miss Kellogg.

Required: Rhetoric 2.

4. Expression.—(1) Rendering, impersonation, dialect reading, character sketches, modern plays, comedies, Shakspere, dramatic action, pantomine. (2) Public addresses, bible and hymn reading, reading of church service, delivery of sermons, conduct of meetings. *Fall, winter, and spring terms, one-fifth study.* Miss Kellogg.

Required: Oral Rhetoric 1.

5. Interpretative Reading.—This course is open to all students who desire to become good readers and interpreters of prose and verse. The principles underlying the art of reading are given in brief practical talks by the instructor. Extracts from English literature are chosen for the illustration of the suggestions offered and reading aloud from standard literature, periodicals, and magazines at sight, is required. *Fall, winter, and spring terms, one-fifth study.* Miss Kellogg.

ROMANCE LANGUAGES AND LITERATURES.

French.

1. For Students in College of Literature.—The course begins with a study of grammatical constructions, with exercises in composition and conversation. Careful attention is given to French pronunciation. Reading of the representative works of

modern authors, such as Halévy, George Sand, Jules Verne, Erckmann-Chatrian, and others. *Fall, winter, and spring terms, full study.* Mr. PIATT.

2. FOR STUDENTS IN ALL THE COLLEGES.—(1) Rapid reading of the representative novels of Chateaubriand, X. de Maistre, Lamartine, Victor Hugo, George Sand, Balzac, Halévy, Erckmann-Chatrian, and others. (2) Outlines of the French literature of the seventeenth, eighteenth, and nineteenth centuries. *Fall, winter, and spring terms, full study.* Professor BRUNER and Mr. PIATT.

Required: French 1 or 5.

3. FOR STUDENTS IN COLLEGE OF LITERATURE.—(1) Rapid reading of the representative dramas of Corneille, Racine, Molière, Voltaire, Beaumarchais, Victor Hugo, Sandeau, Augier, Dumas, Sardou, and others. (2) Lectures on the origin and development of the French drama. (3) Outlines of the French literature of the Middle Ages and the Renaissance. *Fall, winter, and spring terms, full study.* Professor BRUNER and Mr. PIATT.

Required: French 2.

4. FOR STUDENTS IN COLLEGE OF LITERATURE, BUT PRIMARILY FOR GRADUATE STUDENTS.—(1) Old French readings. Clédat, *Les Auteurs Français du Moyen Age;* Suchier, *Aucassin et Nicolete;* Gautier, *La Chanson de Roland.* (2) Physiological phonetics, Lectures; Sweet, *A Primer of Phonetics;* Passy, *Les Sons du Français;* Beyer, *Französische Phonetik.* (3) Old French philology. Lectures on the development of Old French from the popular Latin; Schwan, *Altfranzösische Grammatik. Fall, winter, and spring terms, full study.* Professor BRUNER.

Required: French 3.

5. SPECIAL ONE YEAR'S COURSE FOR STUDENTS IN THE COLLEGES OF AGRICULTURE, ENGINEERING, AND SCIENCE.—This class will be divided into sections for the study of technical and scientific French, suited to the demands of the several colleges, each student working in his own special line. Particular attention will be given to acquiring a technical vocabulary and to rapid reading. *Fall, winter, and spring terms, full study.* Mr. PIATT and Miss SHAWHAN.

ITALIAN.

1. Grandgent's *Italian Grammar;* rapid reading of modern authors: *Dante's Divina Commedia;* outlines of Italian literature. *Fall, winter, and spring terms, full study.* Professor BRUNER.

Spanish.

1. Manning's Spanish Grammar; rapid reading of modern authors; Cervantes' *Don Quijote;* outlines of Spanish literature. *Fall winter, and spring terms, full study.* Professor Bruner.

VETERINARY SCIENCE.

1. Anatomy and Physiology.—The anatomy and physiology of the domestic animals constitute the subjects of instruction for a term. The instruction is given by lectures, aided by demonstrations with use of skeletons and models illustrating the details of structure and formation of parts. This is supplemented by the study of text books. *Strangeway's Veterinary Anatomy; Smith's Physiology of the Domestic Animals. Fall term, full study.* Professor McIntosh.

2. Principles and Practice of Veterinary Medicine.—This subject comprises veterinary medicine, surgery, and hygiene, and is taught by lectures and text books, and illustrated by specimens of morbid anatomy, with observations and practice at the clinics. The latter are held at the veterinary infirmary where a large number of animals are treated or operated upon once each week. Dissections and post mortems are made. *Williams's Practice of Veterinary Medicine and Surgery; Courtney's Practice of Veterinary Medicine and Surgery. Winter and spring terms, full study.* Professor McIntosh.

ZOÖLOGY.

1. General Zoölogy, Major Course.—The work here described forms a continuous course, beginning in the winter term of the freshman year and ending with the fall term of the sophomore year. It is the immediate object of this course to lay the foundation for a working knowledge of zoölogy, and its secondary object to draw from zoölogical science its distinctive discipline as an element in a liberal education. It is planned with a view to giving to students a wide acquaintance with the methods of zoölogical research in field, laboratory, and library, and a general acquaintance with zoölogical theory and the leading facts of observation and experiment upon which such theory rests. It is devoted especially to a series of laboratory studies of animal types, and to lectures on the morphology,

physiology, and relations to nature of this selected series. It is divided into three subdivisions consisting of one term each.

a. The laboratory work of the first term includes dissections of the earthworm, serial sections of this form and of Hydra, and numerous studies and preparations of the Protozoa. Lectures on the structure, physiology, and classification of the Protozoa, their relations to plants and to the organization, embryological development, and history of the higher animals, are made to elucidate and illustrate the general theory of zoölogy, which is here presented in outline to be filled in and completed as the work proceeds. The general zoölogy of the remaining lower invertebrate forms, including Vermes, finishes the work of the term.

b. The second term is devoted to the morphology, physiology, and general classification of the remaining invertebrates, with principal attention to the Arthropoda. It is directed especially towards the entomological course of this department, and is required of all students expecting to take entomology. The laboratory work includes a special study of the crayfish, and of the embryology of the potato beetle, followed by a considerable amount of semi-independent work upon the invertebrate fresh water fauna of the region.

c. The third term's work is done on vertebrates, with principal attention in the laboratory to anatomical work on the larger animals. The general method is that of comparative anatomy, with special reference to the anatomy of man, this part of the course being directed particularly towards the physiological courses of the University which follow upon it. Philosophical zoölogy takes the form in this term of a course of lectures on the general theory of organic development, illustrated by a systematic study by lectures and reading of the modern doctrine of the descent of man. *Winter, spring, and fall terms, full study.* Professor FORBES and Mr. SMITH.

Required: Chemistry 1.

2. This course consists of the first and second terms' work of Zoölogy 1. It will be accepted as major elective work from those who follow it with Entomology (Zoölogy 6). *Winter and spring terms, full study.* Professr FORBES and Mr. SMITH.

Required: Chemistry 1.

3. This course consists of the first and third terms' work of course 1. It will be accepted as major elective work from those

who follow it with Physiology 1. *Winter and fall terms, full study,* Professor FORBES and Mr. SMITH.

Required: Chemistry 1.

4. EMBRYOLOGY.—A course in comparative vertebrate embryology is offered in the winter term. The laboratory work will be chiefly devoted to the practical study of the development of the chick. The student will become familiar with approved methods of sectioning, reconstruction from sections, and other means of embryological study. The more general features of vertebrate embryology will be covered by lectures and required reading. *Winter term, full study.* Mr. SMITH.

Required: Zoölogy 1, 2, or 3.

5. ADVANCED ZOÖLOGY.—To students who have had course 1, 2, or 3, an opportunity is offered for a year's work, two hour's a day, in advanced zoölogy, to be taken individually under the guidance of an instructor. It may be closely adapted to the bent and ability of the student. Three main lines of work will, however, be especially provided for: (1) Systematic zoölogy (including paleontology), with field and laboratory work in the collection, determination, and description of species; (2) œcological studies with a basis in field observations and laboratory experimentation; (3) comparative anatomy and embryology, or other morphological work. A full study of the theory of development, with application in detail to the genealogy of some group of animals is recommended for all students in this course.

Very unusual facilities for the work of this year are at hand in the library and collections of the State Laboratory of Natural History, which occupy rooms convenient to those of the zoölogical department of the University. *Fall, winter, and spring terms, full study.* Professor Forbes.

Required: Zoölogy 1, 2, or 3.

6. GENERAL ENTOMOLOGY.—This course of two terms should be taken by preference in the sophomore year. It is practically a sequel to course 2 in general zoölogy, the work of the second term of that course being directed especially towards entomology.

Presuming upon a general knowledge of the Arthropoda, the instruction begins with more detailed work on Insecta. The greater part of the course consists of laboratory studies of the structure and classification of insects; practice in the determination of species and the description and illustration of species

and structures; field work and observation, including the collection of specimens of all orders and stages, aquatic and terrestrial; office work in the preparation, labeling, and arrangement of collections; a systematic independent study of life histories of selected species, with full records, descriptions, and drawings; experimental insecticide work; and library practice in the collection, collation, indexing, and abstracting of the literature of the species principally studied; concluding with a thesis on a single species studied both biologically and experimentally. Special instruction is given in this course in the art of entomological illustration, under the supervision of an expert zoölogical artist.

It is intended that the student shall come through this course accomplished in all the methods of the zoölogical laboratory as applied to entomology, competent to determine, to draw, and to describe species, and experienced in the various operations of field, laboratory, library, and economic entomology. *Winter and spring terms, full study.* Professor FORBES and Mr. JOHNSON.

Required: Zoölogy 1 or 2.

7. ADVANCED ENTOMOLOGY.—Special courses will be arranged in either technical or practical entomology for students wishing to specialize extensively in this direction, and to such students the facilities of the State Laboratory of Natural History and of the State Entomologist's office will be freely open. Special provision will be made for the instruction and supervision of students desiring to fit themselves for the investigation of the contagious diseases of insects. *Fall, winter, and spring terms, full study.* Professor FORBES and Mr. JOHNSON.

Required: Zoölogy 5.

8. PRACTICAL ENTOMOLOGY.—This is a single term's work open, without conditions precedent, to university students, but offered for the special benefit of students in agriculture. By means of laboratory studies and lectures and field and insectary observations students will be made familiar with the commonest and most important injurious insects, and with means of preventing or arresting their injuries. *Spring term, full study.* Mr. JOHNSON.

9. THESIS INVESTIGATION.—Candidates for graduation in the College of Science who select a zoölogical subject as a thesis are required to spend at least two hours a day for the

winter and spring terms of their senior year in making an independent investigation of some selected zoölogical subject. While this work is done under the general supervision of an instructor, it is in its methods and responsibilities essentially original work. *Fall, winter, and spring terms, full study.* Professor FORBES.

Required: Zoölogy 1, 2, and 4: or 3 and 5.

[In case a course not required for graduation is selected by less than five students, the right to withdraw the same for the term is reserved.]

GRADUATE SCHOOL.

The graduate school is in charge of the committee of the general faculty on administration. This committee consists of the president of the University, the dean of the general faculty and the deans of the colleges.

Graduates of this University and of other colleges and universities of approved standing are admitted to the privileges of advanced work for masters' and doctors' degrees, upon presentation of their diplomas. Candidates for such admission must register in the registrar's office and must announce the general line of study and degree desired. Arrangements in regard to the details of the course of study must be made with the heads of departments in which instruction is sought, and, when properly approved, these arrangements are carried out under the direction of the same heads of departments. Students so entered pay fees for matriculation, if not already matriculated, and for diplomas, but no others.

Graduates desiring a second bachelor's degree and those not entering for a degree are enrolled as *resident graduates*, but not as members of the graduate school. The same fees are charged as for undergraduates.

The courses of study in the graduate school will be adapted in each case as nearly as possible to individual wants.

Further information may be obtained by addressing the Dean of the University Faculty.

COURSES.

Engineering.

In the College of Engineering the following outline of subjects is offered as an aid to candidates for a second or professional degree in the selection of courses of instruction. At least two-thirds of the work of each term must be upon subjects designated primary.

FOR MASTER'S DEGREE IN ARCHITECTURE. (*M. Arch.*)

Primary.

101. Construction of Extensive Wooden Buildings, 1, 2, or 3 credits.
102. Recent Uses of Stone, Brick, and Terra Cotta in Architecture, 1, 2, or 3 credits.
103. Metallic Skeleton Buildings, 1, 2, or 3 credits.
104. Fire-resisting and Fireproof Buildings, 1, 2, or 3 credits.
105. Sanitation of Public and Semi-public Buildings, 1, 2, or 3 credits.
106. Researches on the Evolution of Architectural Styles, 1, 2, or 3 credits.
107. Higher Application of Graphic Statics, 1, 2, or 3 credits.
108. Heating and Ventilation of Large Buildings, 1, 2, or 3 credits.
109. Higher Studies in Architectural Design, 1, 2, or 3 credits.
110. Researches and Experiments in Applied Esthetics, 1, 2, or 3 credits.
111. Translation of an Approved Technical Architectural Work from the French or German, 1, 2, or 3 credits.

Secondary.

112. Stereotomy Applied to American Problems, 1 credit.
113. Examinations of Heating and Ventilation of Buildings, 1, 2, or 3 credits.
114. Higher Workshop Practice, 1 credit.
115. Photography for Architects, 1 credit.
116. Methods of Reproducing Drawings, Specifications, etc, for Architects, 1 credit.
117. Higher Problems and Methods in Perspective, 1 or 2 credits.
118. Practice in Estimates, Specifications, etc., for Large Buildings, 1, 2, or 3 credits.
119. Higher Industrial design, 1 or 2 credits.
120. Advanced Water-color Painting, 1 credit.
121. Study of Office Methods and Arrangements, 1 credit.
122. Any Major offered in the College of Engineering, 1 credit.

FOR MASTER'S DEGREE IN CIVIL ENGINEERING, AND IN MUNICIPAL AND SANITARY ENGINEERING (C. E.).

All primary unless otherwise stated. Each 1 credit.

RAILWAY ENGINEERING.

101. Location and Construction.
102. Railway Track and Structures, and their Maintenance.
103. Yards and Terminals.
104. Motive Power and Rolling stock.
105. Signal Engineering.
106. Railway Operation and Management.

BRIDGE ENGINEERING.

107. Bridge Designing.
108. Cantilever and Swing Bridges.
109. Metallic Arches.
110. Metallic Building Construction.
111. Roof Construction.
112. Stereotomy.
113. History of the Development of Bridge Building—Secondary.

WATER SUPPLY ENGINEERING.

114. Tanks, Stand Pipes, and Reservoirs.
115. Sources and Requirements of Water Supply for a City, and Removal of Impurities.
116. Water Works Management and Economics.
117. Pumps and Pumping.
118. General Water Works Construction.
119. Biological and Chemical Examination of Potable Water.
120. Description of Water Supply Systems—Secondary.

SEWERAGE.

121. Sewage Purification.
122. Sewage Disposal Works.
123. General Sewerage Design and Construction.
124. City Sanitation.
125. Description of Sewerage Systems—Secondary.

ROAD ENGINEERING.

126. Economic Aspect of Good Roads and Pavements.
127. Construction of Roads and Pavements.

MISCELLANEOUS SUBJECTS.

128. Practical Astronomy.
129. Description of Work Done.
130. Critical Description of Engineering Construction.
131. Translation of Technical Engineering Work from French or German.
132. Any primary in Theoretical and Applied Mechanics.

133. Any primary in Mathematics, Mechanical Engineering, or Electrical Engineering—Secondary.

FOR MASTER'S DEGREE IN ELECTRICAL ENGINEERING (E.E.)

Primary.

101. Mathematical Theory of Electricity and Magnetism, 1, 2, or 3 credits.

102. Absolute Measurements in Electricity and Magnetism, 1, 2, or 3 credits.

103. Dynamo Electric Machinery, 1, 2, or 3 credits.

104. Electrical Transmission of Power, 1, 2, or 3 credits.

105. Electro Metallurgy, 1, 2, or 3 credits.

106. Photometry, 1, 2, or 3 credits.

107. Calorimetry, 1, 2, or 3 credits.

108. Economy of Production and Utilization of Electrical Energy, 1 credit.

109. Consulting Engineering, 1 credit.

Secondary.

110. Mathematics, 1, 2, or 3 credits.

111. Physics, 1, 2, or 3 credits.

112. Language, 1, 2, or 3 credits.

113. Chemistry, 1, 2, or 3 credits.

114. Architectural Engineering, 1, 2, or 3 credits.

115. Civil Engineering, 1, 2, or 3 credits.

116. Municipal and Sanitary Engineering, 1, 2, or 3 credits.

117. Mechanical Engineering, 1, 2, or 3 credits.

118. Translation of Technical Engineering Works.

FOR MASTER'S DEGREE IN MECHANICAL ENGINEERING (M. E.)

Primary.

101. Advanced Machine Design, 1, 2, or 3 credits.

102. Graphics and Kinematics, 1 credit.

103. Mill Engineering, 1 credit.

104. Steam Engineering, 1, 2, or 3 credits.

105. Experimental Engineering, 1 credit.

106. Thermodynamics, 1 credit.

107. Pneumatics, 1 credit.

108. Hydraulic Machinery, 1 credit.

109. Mechanical Technology, 1 credit.

110. Translation of Technical Engineering work, 1 credit.

Secondary.

111. Any primary offered in the College of Engineering, 1 credit.

Primary subjects which may be taken as secondary in any course for the Master's Degree in the College of Engineering.

Theoretical and Applied Mechanics.

101. Analytical Mechanics.
102. Resistance of Materials.
103. Hydraulic and Hydraulic Engineering.
104. Laboratory of Applied Mechanics.

Economics.

100. Principles of Economics (advanced course).—This course is a study of economic theory, beginning with the Physiocrats. Special attention is paid to recent development. It is based on Smith, Mill, Cairnes, Marshall, Roscher, Knies, Wagner, Böhm-Bawerk, Clark, and Patten. It is open to seniors who have taken at least two years' work in Economics. *Fall, winter, and spring terms, full study.* The class will meet at least twice a week at the convenience of the instructor and students. Professor Kinley.

In addition to the courses outlined above, the following subjects in other departments will be counted for credits in *economics for students who are specializing in economics and who have previously taken the requirements specified under the courses.*

101. Agriculture 7.

Required: Economics 1 and 2.

102. Forestry. See *Horticulture* 3. This is a well developed course in Forestry based on a series of experiments in forestry for the state begun twenty-four years ago.

Required: Economics 5.

103. Social Ethics. See Practical Ethics. (Philosophy 6.)

Required: Economics 8.

104. Psychology of the Abnormal Types. See Psychology 6.

Required: Economics 8.

Anthropology. Under Anthropology several courses are open to students of Economics. They will be required of students who wish to do their major work in Sociology rather than in Economics.

105. General Course in Anthropology. See Anthropology 1.

106. Early English Legal Codes. See English 14.

107. Anthropometry. A short course in physical measurements with reference to comparative race anatomy, by the Director of Physical Training.

108. Biology. See General Biology 1, 2.

At least one of these courses in biology will be required of graduate students who make sociology a major. Other students are advised to take the work as a basis for that subject.

English.

Early English Legal Codes. See English 14 in General List of Subjects.

Mathematics.

The work of the third and fourth years of the mathematical course in the College of Science counts as graduate work for all students except those who are working for their first degree in mathematics.

SUMMER SCHOOL.

PROFESSOR DAVID KINLEY, DIRECTOR.

The second session of the summer school of the University of Illinois will open June 17, 1895, and will continue for four weeks.

In its summer session the University aims to offer work of university grade which shall in its character be especially adapted to the needs both of university students and of teachers in the public schools. Students who are back in their studies, or who wish to anticipate studies, and teachers who wish to broaden their knowledge and strengthen themselves in the matter of attainment, will find in the summer school of the University abundant opportunity to accomplish these purposes. The facilities for study in the branches offered, and the character of the instruction, are of the best the university affords.

The splendid library, laboratory, and work-shop, facilities of the University will be at the service of students in the branches offered, and the students will be in the same relation to the University as those regularly enrolled in the University year. The regular subjects of instruction for the coming session will be Botany, Chemistry, Economics, English Language and Literature, Entomology, History, Manual Training, Mathematics, Pedagogy, Physical Culture, Physiology, Psychology, and Zoölogy.

In addition to these subjects, authorized University tutors will organize private classes in Drawing, French, German, Greek, Latin, elementary Science, and other subjects. For entrance to these classes a fee of fifty cents per lesson will be charged for single pupils, with a suitable reduction for classes of five or more.

In addition to the courses of study offered, courses of lectures will be given by the President of the University and various members of the faculty, as described below, on subjects both of general interest and of particular value with reference to the work of the school. These lectures will be free to all

members of the summer school and all who are pursuing studies under the authorized university tutors. For all others a fee of one dollar will be charged for the course.

For students in Botany, Entomology, and Zoölogy, there will be offered an opportunity for independent work not available anywhere else in the country. They will be permitted to take ten days' practice in field work, and laboratory study of living specimens, at the university biological station at Havana. The work will be under the supervision of a university instructor. The director of the station, the state entomologist, will make the necessary provision of room, tables, microscopic equipment and other apparatus for such students by the sixth of June. Those who wish to avail themselves of this opportunity must enroll with the director of the summer school and pay their tuition *in advance of that date.*

The tuition fee for the summer session is $10. Small fees will be charged from those who do laboratory work, to cover the actual cost of breakage and material.

In order that no time may be lost from work, intending students are earnestly urged to arrive and register on Saturday, June 15.

COURSES OF INSTRUCTION.

BOTANY.—Mostly laboratory work upon phænogamic and cryptogamic plants, especially structure and physiology. Individual students will, as far as possible, have courses arranged to suit their needs. Field excursions. Mr. G. P. CLINTON, Assistant in Botany.

CHEMISTRY—1. *General Chemistry.*—The training in this course is directed especially toward the development of a knowledge of the best laboratory methods. Dr. H. S. GRINDLEY, Assistant in Chemistry.

2. *Qualitative Analysis.*—Determination of the constituents of unknown substances and mixtures. Dr. H. S. GRINDLEY, Assistant in Chemistry.

Special laboratory courses in other lines of chemical work may be arranged for by those who have the requisite preparation. Such advanced work may include various lines of qualitative analysis, organic chemistry, etc.

ENGLISH.—1. *English Literature.*—A detailed study of one representative author. Assistant Professor KATHARINE MERRILL.

2. *Advanced Rhetoric.*—This course will consist of a topical study of the chief points of rhetoric, based on a comparison of the following text-books: A. S. Hill, Principles of Rhetoric. Genung, Practical Rhetoric. Bain, Higher English Grammar. Assistant Prof. KATHARINE MERRILL.

ENTOMOLOGY.—The equipment, library, and collections of the office of the State Entomologist, including its completely furnished insectary, will be open to the students of the Summer School, and opportunity will be given them to learn and practice, under expert guidance, methods of collecting and preserving specimens, and methods of observation, experimentation, and record. Provision will also be made for those desiring to spend some time in the determination of insects, and general instruction will be given by means of lectures and assigned reading. Mr. W. G. JOHNSON, Assistant Entomologist.

HISTORY.—1. *History of the United States.*—A rapid survey of the history of the country, and a careful study of the political, social, and industrial forces, and the physical conditions, which have determined the direction of American national development and character. Prof. KINLEY and Mr. N. A. WESTON.

2. *Foreign Relations of the United States.*—A course of lectures on the relations of this country to foreign powers under the Monroe Doctrine. Mr. N. A. WESTON.

MANUAL TRAINING.—The work offered in these courses is such as will be of direct and immediate use to teachers in manual training schools and in public schools in which manual training is taught.

1. *In Wood.*—Planing flat, square, and octagonal prisms and cylinders; framing with single, double, and oblique tenons; splices, straight and scarfed, miter, lap, and gained joints; through and lap dove-tails; moldings, miters, miter-box and panels. Mr. H. E. PARKER, Assistant in Architectural Shops.

2. *In Iron.*—The work offered will be either special work with such machine tools as the lathe, the planer, the shaper, the milling machine, or the grinding machine; or general work, extending over the regular exercises of the work in shop practice, paying particular attention to the systems employed in the distribution of work and methods of recording work done by the students in regular university course. Mr. CYRIL B. CLARK, Foreman in Machine Shop.

MATHEMATICS.—1. *Algebra.*—A rapid review of fundamental processes. Functions and their notations; series and the theo-

ries of limits; imaginary quantities; general theory of equations. Mr. C. A. GUNN, Assistant in Architecture.

2. *Trigonometry.*—Plane and Spherical. Mr. C. A. GUNN, Assistant in Architecture.

3. *Analytical Geometry.*—The aim is to acquaint the student with analytical methods of investigation and to familiarize him with some of the most recent developments in synthetic geometry. Mr. C. A. GUNN, Assistant in Architecture.

PEDAGOGY.—First Week: Review of the History of Education from the point of view of the Herbartian system. Second Week: Relation of Herbartianism to the system of Pestalozzi. Third and Fourth Weeks: Introduction to Herbartianism. The lectures will throughout be based on the untranslated minor works of Herbart, which are essential to an understanding of his system. Round table conferences will correlate the results of the lectures with the existing common school pedagogy. Professor ECKOFF.

PHYSICAL CULTURE.—The gymnasium will be available for both men and women, and instruction will be given in the modern scientific methods of physical education, including elementary and advanced work.

1. *School Gymnastics*, without apparatus; light gymnastics, military drill, fencing, and apparatus work, Indian clubs, etc.

2. *Delsarte* work, exercises for health. grace, and expression; statue poses and pantomine. Miss ANITA M. KELLOGG, Instructor in Physical Culture for Women.

PHYSIOLOGY.—A rapid survey of the entire field of human physiology, more or less full in proportion to the time devoted to the subject will be made. The laboratory work will illustrate the different classes of methods that are available in this science, especial attention being paid to those that can be used in class demonstrations in elementary teaching without the use of costly apparatus. Assistant Professor SUMMERS.

POLITICAL ECONOMY.—1. *The Labor Question.*—The first two weeks will be devoted to a study of the labor problem. Some of the topics treated will be: The condition of labor, grievances, labor organizations, strikes, and co-operation. Professor KINLEY.

2. *Money and Banking.*—The second two weeks will be devoted to a discussion of monetary and banking principles and history, with special reference to the United States. Professor KINLEY and Mr. N. A. WESTON.

PSYCHOLOGY.—Basis for work: Herbart's Text Book of Psychology, International Education Series, omitting Mathematics. The deficiencies of this translation will be supplied by lectures on the original. Round table conferences will correlate the psychology and pedagogy of Herbart. Professor ECKOFF.

ZOÖLOGY.—With beginning students a small number of common forms will be studied, to show how the animals of our own regions may be used in practical work in zoölogy, and to give some training in dissection and in the use of the microscope and its accessories. Advanced students may make a more detailed study of the larger number of type forms. A series of lectures on the relationships of the forms studied will be given. Assistant Professor SUMMERS.

PUBLIC LECTURES, FREE TO MEMBERS OF THE SUMMER SCHOOL AND STUDENTS IN THE PRIVATE CLASSES.

Educational topics, six lectures. PRESIDENT DRAPER.

Socialism and Social Reform, three lectures. Professor KINLEY.

Why and How We Breathe, one lecture. Professor SUMMERS.

Poe and Hawthorne, one lecture. Professor KATHARINE MERRILL.

Interpretative Recital. MISS KELLOGG.

SUBJECTS IN WHICH PRIVATE CLASSES WILL BE ORGANIZED.

French and German.—Mr. H. S PIATT.

Free Hand Drawing.—E. J. LAKE, Assistant in Art and Design.

Latin and Greek.—Miss BERTHA M. PILLSBURY.

Science Teaching.—To meet the demand for teachers of science in district and graded schools courses in elementary science are offered. The courses will be given by Prof. E. G. HOWE, author of "Systematic Science Teaching," aided by efficient assistants.

Instruction in other subjects will be provided for to meet a demand.

Intending students who wish to secure rooms in advance, or desire further information concerning the work of the school, are invited to correspond with the director.

PRIZES AND SCHOLARSHIPS.

THE HAZLETON PRIZE MEDAL.

Capt. W. C. Hazleton provided a medal, of beautiful and artistic design, which is to be awarded at a competitive drill to be held near the close of the year, to the best drilled student Each competitor must have been in attendance at the University for at least sixteen weeks of the current college year; must not have had more than four unexcused absences from drill; and must present himself for competition in full uniform.

The award will be made on the following points:

1. Erectness of carriage, military appearance, and neatness.
2. Execution of the school of the soldier, without arms.
3. Manual of arms, with and without numbers.

The successful competitor will receive a certificate setting forth the facts, and may wear the medal until the 15th day of May following, when it will be returned for the next competition.

THE HENRY H. HARRIS PRIZE IN BANKING.

Henry H. Harris, Esq., of Champaign, offers a prize of one hundred dollars for the best essay on the History of State Banking in Illinois. Competition for this prize is open to all students, graduate and undergraduate, of the University of Illinois. All essays entered in competition are due and must be received by the Professor of Economics by noon of the first of May, 1896. The award will be made in accordance with conditions to be announced hereafter.

The right of not awarding the prize is reserved, if no one of the essays handed in is deemed of sufficient merit. Should the prize not be awarded in 1896, it will remain open for another competition.

HONORARY SCHOLARSHIPS.

Provision has been made for one honorary scholarship for each county in the state. The holder of the scholarship may

attend the University for four years, under proper regulations, free of charge for tuition or incidental expenses. The total value of this scholarship is $90.

Several of these scholarships are already occupied. The vacancies in other counties will be filled as follows:

Examinations are to be held in the several counties, under the supervision of the county superintendents thereof, on the second Friday and Saturday of June, at such places as the superintendents may select. Candidates for the examination must be approved in the common English branches by the superintendents. Questions will be furnished from the University, and the answers, in writing, will be sent to the University for judgment. The scholarship will be awarded to the candidate who passes the best examination, provided he has a standing in each subject of not less than 75, and an average standing on all the subjects of not less than 80 per cent.

Each pupil who enters the examination may choose whether he will be examined to enter upon a course in the Colleges of Engineering, Science, or Agriculture, or one of the courses in the College of Literature and Arts.

In the first case, the subjects of his examination will be algebra, geometry, physiology, botany, natural philosophy, and English rhetoric and composition.

In the second case, the subjects will be as above, three books of Cæsar, five orations of Cicero, and six books of the Aeneid.

The two classes of examination are intended to conform to the requirements stated under the head, *Entrance Examinations*, p. 182. It is essential that the examinations in the counties be held at the time named above, publicly, and with reasonable notice; requests for special or private examinations cannot be considered.

ACCREDITED SCHOOL SCHOLARSHIPS.

Scholarships in the University are offered to high schools on its accredited list, one a year to each school, upon the same terms and subject to the same conditions as the HONORARY SCHOLARSHIPS heretofore established, *except as noted below.*

1. Examinations for the *accredited school scholarships* will be held at the several accredited schools, by the principals thereof, on the third Thursday and Friday in May.

2. There need be no advertisement of the examination, further than by principals to all pupils eligible to pass the same.

3. The term of each scholarship will be for the two school years next after the examination upon which it was awarded, and vacancies will not be filled, except that if any person to whom a scholarship has been awarded shall be unable to accept the same, then the next highest in the competition may be awarded the scholarship.

4. Scholarships will be awarded on these examinations to such persons only as shall be full graduates of their several accredited schools, either of the current or some preceding year.

CHICAGO CLUB LOAN FUND.

The CHICAGO CLUB OF THE UNIVERSITY OF ILLINOIS offers two loans of $250.00 each, payable to the beneficiary, $100.00 the first year, $75.00 the second year, $50.00 the third year, and $25.00 the fourth year. The loans are offered to residents of Cook County, Illinois, only, and are to be awarded upon competitive examination to those obtaining the highest average grades. The loans are due six years after matriculation. They bear no interest while the student is in school, but six per cent after graduation. The examination questions are prepared at the University and cover the same subjects as those for the honorary scholarships.

MILITARY SCHOLARSHIPS.

Students who have gained six term credits in class room military instruction and six such credits in drill practice are eligible for appointment as commissioned officers of the battalion. Those attaining this rank may have awarded them special scholarships, good for one year and equal in value to the University term fees for the same length of time.

FELLOWSHIPS.

The University offers six fellowships, open to graduates of this or other similar institutions, conditioned upon required qualifications and a designated amount of service to the University. Each fellowship is good for one year and has a money value of $400.00, payable in ten monthly installments. Appoint-

ments to these fellowships are made upon the grounds of good character, high attainments, promise of distinguished success in the line of studies chosen, and of usefulness to the University. The holders of the fellowships are required to give instruction in assigned subjects five to ten hours a week during the year. The time remaining is to be devoted to graduate study, and fellows are enrolled as members of the graduate school. Advanced degrees are open to them as to other members of this school.

SOCIETIES.

The Literary Societies have from the opening of the University enjoyed its fostering care.

The ADELPHIC and PHILOMATHEAN societies, for men, and the ALETHENAI, for women, occupy spacious halls, which the members have furnished and decorated with taste and elegance. Meetings are held Friday evenings throughout the term time, are well attended, and are maintained with unflagging interest. They furnish excellent drill in writing, speaking, and parliamentary methods.

Both the YOUNG MEN'S and YOUNG WOMEN'S CHRISTIAN ASSOCIATIONS are active and useful organizations, and have a large membership.

Subscriptions have been made by students and graduates, amounting to about $23,000.00, towards a new building for these organizations. A canvass has been started outside with the hope of raising the sum to $32,000.00. If this is successful the building will be begun at once. An excellent site has been purchased.

Special organizations unite the students of NATURAL HISTORY, of CIVIL ENGINEERING, of MECHANICAL ENGINEERING, of ARCHITECTURE, of AGRICULTURE, and of CHEMISTRY, and in ATHLETICS.

REGULATIONS AND ADMINISTRATION.

ADMISSION.

[For further information than is here given address W. L. Pillsbury, Registrar, Urbana, Ill.]

Examinations of candidates for admission to the University, or to any of its departments, are held at the University Thursday, Friday, and Saturday before the beginning of the fall term in September and on the two days previous to the opening of each of the other terms, and at other times and places specially announced.

Applicants must be at least sixteen years of age, and it is considered desirable that they be two or three years older than this. The average age at entrance is almost exactly twenty years. They must pass the required examinations, and must pay the prescribed fees. No distinction is made in regard to sex, nativity, color, or place of residence. Entrance may be made at any time, provided the candidate is competent to take up the work of the classes then in progress; but it is very much better to begin upon the first collegiate day in September, when a large number of the classes are organized, several of them to continue during the year. Satisfactory entrance may usually be made at the beginning of the winter term.

ENTRANCE EXAMINATIONS.

The subjects upon which the entrance examinations are held are numbered and described in the list given below. Those required for the several colleges and courses are designated by the groups of numbers corresponding to the subjects in the list. The physics, physiology, and botany described are each required as preparatory to these subjects as taught in this University. The text books are named only to aid in showing the requirements. Equivalents are accepted.

1. For the College of Literature and Arts.—Subjects; 2, 6, 7, 8, and any three from 9, 10, 11, 12, 13, 14. For those who desire

to take courses including Greek, 9 is required and may be presented instead of the three sciences which would otherwise be selected from 12 to 18.

2. For the Colleges of Engineering, Science, and Agriculture. —Subjects 1, 2, 7, 8, and any three from 9, 10, 11, 12, 13, 14. Instead of the literature part of 2, 3 or 4 will be accepted; but candidates presenting one of these will be required to take language work for one year more in his undergraduate course.

For 1896 and afterwards the whole of parts (1) and (2) of subject 2 and one of subjects 3, 4, 6, will be required for the Colleges of Engineering and Science, and subject 15 will be required for the College of Engineering.

3. For entrance to the University without designation of a particular department.—Subjects 1, 2, 7, 8, and any three from 3, 4, 5, 6, 9, 10, 11, 12, 13, 14. In this case special attention must be paid to the requirements for entrance to particular classes as given above and in connection with the description of the subjects taught, p. 95, also to the requirements for a degree, if this is desired, p. 195.

4. Persons over twenty-one years of age, not candidates for a degree, may be admitted to classes, after satisfying the president and professor in charge of the department in which such classes are taught, that they possess the requisite information and ability to pursue profitably, as special students, the chosen subjects. Such students are not matriculated: they pay the fees required of students in the preparatory classes.

Subjects for Entrance Examinations.

1. The most important facts in the history of the United States from the settlement of the country to the present time, but especially the main features of the constitution and the development under it of the republic and of the states.

At examinations for 1896 and afterwards the requirements for admission in History will be as follows:

At least one full year's work in any one of the three following subjects:

(*a*) History of Greece and Rome;

(*b*) History of England and the United States;

(*c*) General History.

The following text books will indicate roughly the amount of knowledge required: Greece—Oman, History of Greece; Rome —Allen, Short History of the Roman People; England—Guest and

Underwood, Handbook of English History, or Higginson and Channing, English History for American Readers; the United States—Johnston, History of the United States for Schools, or Thomas, History of the United States. These text books are not prescribed and any real equivalents will be accepted. A good knowledge of historical geography will be insisted upon, and teachers are strongly recommended to supplement the text-book work by collateral reading on assigned topics.

2. ENGLISH.—Correct spelling, capitalization, punctuation, paragraphing, definition, and proper use of rhetorical figures: a knowledge of the qualities of style, the kinds of discourse, and the elements of versification: an acquaintance with the masterpieces of English literature. Besides answering questions on the above, the candidate will be required to write an essay of something like 500 words to illustrate his power of using the English language, and his knowledge of the literature. For 1895 the subject of the essay will be taken from Shakspere's Henry V, Scott's Ivanhoe, Macaulay's Essay on Clive, Hawthorne's House of Seven Gables, Longfellow's Tales of a Wayside Inn. Real equivalents for any of these works will be accepted.

At examinations for 1896-7, and afterwards, the requirements will be as follows:

For the Colleges of Engineering, Science, and Agriculture: (1) ENGLISH COMPOSITION AND RHETORIC.—No pupil will be accepted whose written work is notably deficient in point of spelling, punctuation, idiom, or paragraphing. Two classes of books are assigned for each year, the one for general reading and composition work, the other for minute and critical study. The written statement of the teacher, together with the essay, will be accepted as sufficient test of study in class A. The candidate will be required to write two essays of about two hundred words each, the subject of one of which shall be suggested by the books assigned in class A, below, for reading. A knowledge of the elements of Rhetoric will be required.

(2) LITERATURE.—An outline of American Literature.

For the College of Literature and Arts: In addition to the requirements described in the two preceding paragraphs, an examination on the subject matter, form, and substance of the books in class B, below, designated for minute and critical study.

A.—For General Reading and Composition Work:

1896.—Shakspere's "A Midsummer Night's Dream;" Defoe's "History of the Plague in London;" Irving's "Tales of a Traveler;" Scott's "Woodstock;" Macaulay's "Essay on Milton;" Longfellow's "Evangeline;" and George Eliot's "Silas Marner."

1897.—Shakspere's "As You Like It;" Defoe's "History of the Plague in London;" Irving's "Tales of a Traveler;" Hawthorne's "Twice Told Tales;" Longfellow's "Evangeline;" and George Eliot's "Silas Marner."

B.—For Minute and Critical Study:

1896.—Shakspere's "The Merchant of Venice;" Milton's "L' Allegro," "Il Penseroso," "Comas," and "Lycidas;" and Webster's "First Bunker Hill Oration."

1897.—Shakspere's "The Merchant of Venice;" Burke's "Speech on Conciliation with America;" Scott's "Marmion;" and Macaulay's "Life of Samuel Johnson."

3. FRENCH.—Elements of grammar, tested by the correct translation of simple English sentences into French and by questions; reading easy French prose at sight. At least one year's work.

4. GERMAN.—Elements of grammar, tested by the correct translation of simple English sentences into German and by questions; reading easy German prose at sight. At least one year's work.

5. GREEK.—Greek Grammar (Goodwin's), Greek Prose Composition (Collar and Daniell's), and three books of Xenophon's Anabasis, or an equivalent amount from any classic Greek author.

At examinations for 1896–7 and afterwards the first three books of Homer's Iliad, except lines 494–759 of Book II. will be required.

6. LATIN.—Three books of Cæsar's Commentaries, five Orations of Cicero, six books of Vergil's Aeneid, with scansion of hexameter verse and the translation of English sentences into Latin prose, based on the portions of Cæsar and Cicero above named. This will necessitate a thorough knowledge of the etymology and syntax of Latin grammar. Allen and Greenough's or Harkness's Grammar and Collar's Latin Prose Composition are recommended. Real equivalents for any of the above mentioned works will be accepted. The Roman method of pronunciation is used.

At examinations for 1896–7 and afterwards one additional book of Cæsar and one additional oration of Cicero will be required.

7. ALGEBRA.—Fundamental operations, factoring, fractions, simple equations, involution and evolution, radicals, quadratic equations and equations reducible to the quadratic form. The subject as given in Wells's Higher Algebra through quadratic equations, or the same in Wentworth's Algebra.

8. GEOMETRY.—Plane, solid, and spherical geometry as given in Wells's or Wentworth's Plane and Solid Geometry, or the equivalent of these.

At the examinations for 1896–97 and afterwards, solid and spherical geometry will be dropped from the requirements for admission to the College of Literature and Arts.

9. ASTRONOMY.—The subject as given in Newcomb and Holden's Astronomy for High Schools and Colleges, or Young's Elements of Astronomy.

10. BOTANY.—The parts and organs of plants in the descriptive language of the science; the relations of plants to the atmosphere, to temperature, light, soil, etc., to the inferior animals, and to man; characteristics of prominent orders and the determination of species by use of an artificial key. Gray's Lessons and Manual.

11. CHEMISTRY.—Elementary Inorganic Chemistry as presented in Remsen's Chemistry, Briefer Course; Shepard's "Elements of Chemestry; "Eliot and Storer's "Manual of Elementary Chemistry," or Armstrong and Norton's "Laboratory Manual of Chemistry."

Laboratory practice is essential for the proper preparation in this subject and the laboratory note book must be submitted.

12. PHYSICS.—The elements of physics as given in Gage's Introduction to Physical Science, taught with the use of apparatus for illustration and experiment. It is earnestly recommended that all teachers who can command the necessary apparatus prepare their pupils in a course of experiments such as is outlined in Hall & Bergen's Text Book of Physics.

At the examinations for 1896–7 and afterwards, Physics will be an absolute requirement for admission to all the colleges.

13. PHYSIOLOGY.—The anatomy, histology, and physiology of the human body and the essentials of hygiene, taught with the aid of charts and models and demonstrations upon inferior

animals, to the extent given in Martin's Human Body, Briefer Course.

14. Zoölogy.—The subject as taught in the best high schools with laboratory facilities. Mere text-book work will not be accepted.

15. Free Hand Drawing. Ten hours a week for one term, or the equivalent thereof will be required for 1896 and afterwards, as a preparation, for the College of Engineering. The teacher's statement that the work has been done will be required and the candidate for admission will be examined.

All persons who wish to enter the University at the opening of the term 1895, except those holding certificates of graduation from accredited schools, must present themselves at the registrar's office, room 14, University Hall, at 9 o'clock a.m., Thursday, September 5th. At that time applications for admission will be received, also certificates covering part of the examinations, and applicants will be given all necessary directions as to examinations.

The program of examinations is as follows:

U. S. History	Thursday	1:00 p.m.
Physics	"	3:00 "
Algebra	Friday	8:00 a.m.
Physiology	"	1:00 p.m.
Botany	"	3:00 "
Geometry	Saturday	8:00 a.m.
French	"	1:00 p.m.
German	"	3:00 "
English	Monday	8:00 a.m.
Zoölogy	"	1:00 p.m.
Chemistry	"	3:00 "
Latin	Tuesday	8:00 a.m.
Astronomy	"	1:00 p.m.
Greek	"	3:00 "

ACCREDITED HIGH SCHOOLS.

The faculty, after personal examination, appoints accredited high schools, whose graduates may be admitted to the University without examination. These must be schools of first-rate character, whose course of instruction includes all the studies required for admission to some one of the colleges of the University. If so requested, a member of the

faculty will examine a school as to its facilities for teaching, its course and methods of instruction, and the general proficiency shown. The University bears the expense of this examination. If the report is favorable, a certificate of that fact is forwarded, and the name of the school is entered in the published list of high schools accredited by the University. The graduates of these schools are admitted to any course for which their high school studies, as certified by the principal, have prepared them. Annual reports are asked from these schools. A re-examination will be made whenever it may be deemed necessary.

Accredited for the Colleges of Literature, Engineering, Science, and Agriculture.

School.	Superintendent.	Principal.
Alton.	R. A. Haight.	G. E. Wilkinson.
Arcola.	G. W. Smith.	Sara Burns.
Atlanta.	T. H. Haney.	Hattie M. Montgomery.
Aurora—East.	J. H. Freeman.	Wm. J. Pringle.
Aurora—West.	A. V. Greenman.	Katharine Reynolds.
Aurora—Jennings Seminary.	Rev. A. R. Cronce, President.	
Austin.	N. D. Gilbert.	B. F. Buck.
Beardstown.	G. W. Powell.	Elva J. Saunders.
Belvidere—North.	H. A. Warren.	Flora Fellows.
Bement.	J. M. Martin.	J. M. Martin.
Bloomington.	E. M. Van Petten.	F. B. Spaulding.
Cairo.	T. C. Clendenen.	John Snyder.
Camp Point.	H. W. Bowersmith.	H. W. Bowersmith.
Carbondale—H. S. Dept. Southern Illinois, Normal University.		George W. Smith.
Carthage.	W. K. Hill.	W. K. Hill.
Canton.	C. M. Bardwell.	C. S. Aldrich.
Carrolton.	Clyde Stone.	Lottie Weber.
Charleston.	J. W. Henninger.	Louise Baumberger.
Chicago—		
Auburn Park.	Albert G. Lane.	A. S. Hall.
Englewood.	"	J. E. Armstrong.
Hyde Park.	"	C. W. French.

School.	Superintendent.	Principal.
Lake.	Albert G. Lane.	E. F. Stearns.
Lake View.	"	Jas. H. Norton.
North Division.	"	O. S. Wescott.
Northwest Div.	"	Franklin P. Fisk.
South Division.	"	Jeremiah Slocum.
South Chicago.	"	Chas. I. Parker.
West Division.	"	G. M. Clayberg.
Clinton, Ia.	O. P. Bostwick,	Julia J. Sweet.
Danville.	Joseph Carter.	S. A. D. Harry.
Davenport, Ia.	J. B. Young.	H. H. Roberts.
Decatur.	E. A. Gastman.	J. J. Sheppard.
Delavan.	F. L. Calkins.	A. T. Rosa.
Dundee.	S. M. Abbot.	S. M. Abbot.
Elgin.	H. F. Derr.	Eugene A. Mead.
Elmwood.	S. B. Allison.	Harriet Watrous.
Evanston.	(Township High School.)	H. L. Boltwood.
Farmer City.	C. C. Corey.	C. C. Corey.
Freeport.	F. T. Oldt.	W. D. Hawk.
Galena.	Ira C. Baker.	F. Aubuchou.
Galesburg.	W. L. Steele.	Mary E. Gettemey.
Galva.	F. U. White.	L. V. Johnson.
Geneseo.	M. F. Miller.	Ada M. Schnabele.
Griggsville.	H. C. McCarrel.	H. C. McCarrel.
Jacksonville.	John R. Long.	Virginia Graves.
Jerseyville.	J. Pike.	Edward B. Shafer.
Joliet.	W. H. Campbell.	J. Stanley Brown.
Kankakee.	F. N. Tracy.	E. D. Walker.
Keokuk, Ia.	O. W. Meyer.	G. E. Marshall.
Kewanee.	A. C. Taylor.	Horace Phillips.
La Grange.	(Township High School.)	E. G. Cooley.
Macomb.	S. F. Hall.	C. M. Brunson.
Mattoon.	B. F. Armitage.	E. Kate Carman.
Maywood.	C. W. Minard.	J. Porter Adams.
Mendota, West.	S. E. Beede.	S. E. Beede.
Moline.	H. M. Slauson.	F. A. Manny.
Monmouth.	James C. Burns.	W. D. McDowell.
Morrison.	W. A. Pratt.	P. F. Burtch.
Nashville.	J. B. Bundy.	J. W. Emmerson.
Normal, H. S. Dept. Illinois. Normal University.		O. L. Manchester.
Oak Park.	W. H. Hatch.	D. O. Barto.

School.	Superintendent.	Principal.
Ottawa. (Township High School.)		J. O. Leslie.
Paris.	W. W. Black.	C. W. Ricketts.
Pekin.	F. W. Reubelt.	Josephine Goodheart.
Peoria.	N. C. Dougherty.	A. W. Beasley.
Pittsfield.	I. F. Mather.	I. F. Mather.
Pontiac. (Township High School.)		F. L. Bangs.
Princeton. (Township High School.)		R. A. Metcalf.
Quincy.	T. W. Macfall.	W. B. Corbyn.
Rockford.	P. R. Walker.	W. A. Edwards.
Rock Island.	S. S. Kemble.	Geo. L. Leslie.
Roodhouse.	F. H. Cobbs.	R. A. Vance.
Shelbyville.	F. D. Jordan.	Amy L. Schoff.
Springfield.	J. H. Collins.	Wm. W. Helmle.
Sterling, 3d Dis't.	H. L. Chaplin.	Anna Parmelee.
Streator. (Township High School.)		J. W. Coultas.
Taylorville. (Township High School.)		W. E. Andrews.
Tuscola.	A. G. Owens.	Chas. S. Earle.
Upper Alton. (Western Military Academy.)		
	Willis Brown.	Albert M. Jackson.
Virden.	F. E. Kennedy.	F. E. Kennedy.
Wilmington.	J. J. Eckman.	J. J. Eckman.
Waukegan.	Frank H. Hall.	Emily M. Coon.
Yorkville.	W. J. Sutherland.	Cora B. Barney.

Accredited for the Colleges of Science, Engineering, and Agriculture.

School.	Superintendent.	Principal.
Aledo.	P. J. Kuntz.	Mabel Pepper.
Augusta.	Caroline Grote.	Anna H. McKee.
Batavia, West.	J. H. Morton.	J. H. Morton.
Belleville.	H. D. Updike.	H. W. Brua.
Cambridge.	E. E. Jones.	Nora Jones.
Champaign.	C. A. Bowsher.	Lottie Switzer.
Chicago Manual Training, H. H. Belfield, Director.		
Chicago English High and Manual Training School.		A. R. Robinson.
DeKalb.	John T. Bowles.	Lucy H. Carson.
Dixon.	Wm. Jenkins.	Mary S. Porteono.
East St. Louis.	James P. Slade.	Chas. L. Manners.

School.	Superintendent.	Principal.
Effingham.	I. A. Smothers.	J. S. Ragsdale.
Harvard.	Chas. W. Groves.	Chas. W. Groves.
Hillsboro.	Josiah Bixler.	Mattie Hunt.
Keithsburg.	J. F. Main.	Fannie L. Wright.
LaSalle.	G. W. Andrews.	T. C. Kohin.
Lewistown.	Burton E. Nelson.	H. M. Wasmuth.
Lexington.	J. B. Nichols.	J. B. Nichols.
LeRoy.	F. G. Blair.	F. G. Blair.
Lyons, Ia.	E. F. Fitch.	L. Elizabeth Wilson.
Marengo.	C. W. Hart.	C. W. Hart.
Mason City.	J. P. W. Brouse.	Mary Smith.
Milford.	Frank Harry.	Eva Roberts.
Monticello.	E. A. Fritter,	T. C. Frye.
Mound City.	R. M. Roberts.	May Robeson.
Oregon.	L. E. Harriss.	A. M. Steele.
Paw Paw.	M. L. Lyon.	Hattie A. French.
Paxton.	J. M. Robinson.	J. M. Robinson.
Peru.	F. W. Smedley.	Frank Hanft.
Polo.	G. M. Bridgman.	Alice F. Bridgman.
Ridge Farm.	F. P. Burchit.	Jessie Baum.
Rochelle.	C. F. Philbrook.	Minnie G. Steele.
Rossville.	M. A. Kline.	M. A. Kline.
Savanna.	B. F. Hendricks.	Jennie Wright.
Sparta.	S. B. Hood.	J. M. Nickles.
Sterling—		
Wallace.	S. B. Hursh.	Anna E. Eack.
Sullivan.	B. F. McClelland.	Ella Lowe.
Sycamore.	A. J. Blanchard.	Sarah E. Robinson.
Tolono.	C. E. Jeffers.	C. E. Jeffers.
Virginia.	F. W. B. Everhart.	Lydia G. Clark.
Warsaw.	A. W. Hussey.	A. W. Hussey.
Washington.	H. W. Veach.	Anna M. Briggs.
Winchester.	W. A. Bowman.	W. A. Bowman.

REGISTRATION.

At the beginning of each term each student must present himself for registration during the two days preceding the formation of classes; and he must be present and be registered at the first exercise of each class he is to attend.

CHOICE OF STUDIES.

Great freedom in the choice of studies is permitted. It is, however, necessarily required that the student shall be thoroughly prepared to enter and keep pace with the classes in the chosen studies; that he shall take these in the terms and at the time of day elsewhere designated, and that, when expecting to take a degree, he pursue the studies leading to that degree. In the College of Engineering the courses are substantially all prescribed. Following the description of each course of instruction given in the general alphabetical list of courses, will be found the necessary requirements, if any, for admission to that particular course. Careful attention must be given to these requirements and to the sequence of studies thus indicated. For instance, under Astronomy 2, for students of College of Engineering, page 98, there are required "Mathematics 4;" "Physics 1 and 3;" "Theoretical and Applied Mechanics 1." Turning now to the general list of subjects, p. 87, it is found that Mathematics 4 is Trigonometry, Physics 1 is the major course of one year, and Theoretical and Applied Mechanics 1 is Analytical Mechanics. All these subjects must be satisfactorily passed before admission to the class in astronomy can be gained.

The work in military instruction and drill practice is required as described, of all male students during the freshmen and sophomore years. Women may take an equivalent amount of gymnasium drill.

The described courses in rhetoric and oratory must be taken by all students at the times and to the extent given in the suggested and prescribed courses of study.

Each student must have three distinct studies, affording three daily class exercises, unless specially permitted by the faculty to take less or more.

MILITARY SCIENCE.

The military instruction is under the charge of a graduate of the U. S. Military Academy, and an officer of the regular army of the United States. The course as a whole has special reference to the duties of officers of the line. A full supply of arms and ammunition is furnished by the War Department, including 300 cadet rifles and accoutrements, and two field pieces

of artillery. Ammunition is supplied for the practice and target firing and for artillery use.

Every male student, able to perform military duty, and not excused for sufficient cause, is required to drill twice each week until he has gained six creditable term records. He is also required to study Drill Regulations for Infantry and to recite upon the same once a week until he passes two creditable term examinations. This practical instruction begins as soon as possible after he enters the University; but a preparatory student, carrying no freshman studies and not expecting to matriculate during the year, is not permitted to drill. The standings in study and drill are placed on record, with other class credits; two terms of recitations and drill count one credit, and the four remaining terms of drill another, and are requisite to graduation in every University course.

Appointments in the battalion are made on nomination by the professor in charge and confirmation by the faculty.

Students who have passed two examinations in the drill regulations and who have gained two term credits in drill practice are eligible for corporals; those having three term credits in each are eligible for sergeants; and those having six term credits in each, for lieutenants and for officers of higher rank.

The battalion (six companies) is composed mainly of the members of the freshman and sophomore classes; the first supplying the corporals, the second, the sergeants, while the captains and lieutenants are taken from those of the junior and senior classes who have passed through the lower grades satisfactorily.

A special military scholarship, good for one year, is open to each student who attains the grade of a commissioned officer, the value of which is paid the holder at the close of the year.

An artillery detachment is organized mainly from the second year or sophomore class, which receives practical instruction twice each week during the college year.

Towards the close of the spring term, a committee appointed by the faculty examines candidates for nomination to the governor of the state to receive commissions as brevet captains in the state militia. Candidates must be members of the senior class in full standing at the time of this examination; must have completed the course of military studies; must have served three terms as captains or lieutenants, and must be approved

by the faculty as having good reputations as scholars, officers, and gentlemen.

Under the authority of the acts of corporation, the trustees have prescribed a uniform of cadet gray, coat trimmed with black mohair braid, trousers with black cloth stripe, cut after the U.S. army pattern. The uniform of the cadet officers is of dark blue cloth for coat and light blue for trousers; cap for all of dark blue cloth, army pattern, with university badge embroidered thereon in gold bullion; white gloves; that of the band dark blue throughout, with special trimmings.

The University Cornet Band is composed of students, and every full term of service therein is counted as one term of drill.

PHYSICAL TRAINING. 1894-95

This department aims to furnish a rational system of exercise adapted to the needs of the student as a physical basis for complete education.

At the commencement of the year, and again at its close, each student is examined thoroughly according to the Sargent system and his measurements charted, for the purpose of enabling him to compare his condition with a large number of others, and of furnishing him a laudable incentive for bodily improvement. Each student is also given a prescription of exercise having for its object the correction of bodily defects, the promotion of good health, and the symmetrical development of the body, rather than mere accumulation of muscle.

The general work consists of free and light gymnastics in classes, boxing, fencing, wrestling, and work on apparatus.

TERM EXAMINATIONS.

Examinations are held at the close of each term or oftener, or whenever any study has been completed. Any student failing to answer correctly 60 per cent. of the questions proposed, loses all credit for that study, and is precluded from proceeding with any other studies without special permission. If he answers from 60 to 74 per cent. of the questions he is *conditioned* and may have another examination on application to, and arrangement with, the instructor. This arrangement must be made within ten days from notification of term standing; 75 per cent. is required to pass.

A record is kept of each student's term standing.

A statement of the scholarship of each student will be sent to his parent or guardian as soon as may be after the end of each term.

DEGREES.

The usual bachelors' and masters' degrees are conferred upon those who satisfactorily complete the courses of study described under the different colleges. A candidate for a bachelor's degree must pass in the subjects marked *required* in his chosen course, and must conform to the directions given in connection with that course in regard to electives. In the Colleges of Literature and Arts, of Science (41 credits in chemical group), and of Agriculture 40 term credits are required for graduation. In the College of Engineering he must complete the course of study as laid down. This number includes two credits for military science for men, and for women the same number for physical culture. Men excused for cause from the military requirements, and women who do not take courses in physical culture, may elect in lieu thereof two extra terms' work in any subjects taught in the University.

Credits from other colleges or universities may be accepted by the faculty for advanced standing; but at least one year's residence at the University and the completion of one year's work are necessary to secure a bachelor's degree.

In all cases an accepted thesis is required for graduation. The subject must be announced not later than the first Monday in November, and the completed thesis must be handed to the dean of the proper College by April 30th. The work should be done under the direction of the professor in whose department the subject naturally belongs, and should be in the line of the course of study for which a degree is expected. The thesis should be based upon original research, and must contain at least 2,000 words, or an equivalent in tables, drawings, and illustrations. It must be presented upon regulation paper, and will be deposited in the library of the University.

1. The degree of Bachelor of Arts will be given to those who complete a classical course in the College of Literature and Arts.

2. The degree of Bachelor of Letters will be given to those who complete one of the other courses in the College of Litera-

ture and Arts. The name of the course will be inserted after the degree.

3. The degree of Bachelor of Science will be given to those who complete a course of study in the College of Engineering, of Science, or of Agriculture. The name of the course will be inserted after the degree.

4. The master's degrees, A.M., M.L., and M.S., and the equivalent degrees of Civil Engineer and Mechanical Engineer, etc., are given to graduates of this University or of other similar institutions who have pursued at this University a year of prescribed graduate studies and have passed examinations thereon. Non-resident graduates of this University may receive masters' degrees within not less than three years after graduation by successfully passing examinations upon an accepted course of study and practice. (See Graduate School, p. 167.) Studies for a master's degree must be in the general line of the bachelor's degree already received, and of the degree sought.

In all cases an accepted thesis is required, and this should be presented at least one month before the close of the collegiate year. It must be based upon original research and must show scholarly acquirements of high order.

5. The degrees of Doctor of Philosophy and Doctor of Science may be conferred upon graduates of this or other such university or college after three years of graduate study. (See Graduate School, p. 167.)

BOARD.

The University does not furnish board, but there is an abundance of suitable private places in Urbana and Champaign, within walking distance of the University, and easily accessible by electric railway, where students can obtain table board and rooms. Boarding clubs are formed at which the cost of meals is about two and a half dollars a week. Some students prepare their own meals, thus considerably reducing expenses.

The Business Agent and the Young Men's and Young Women's Christian Associations of the University will aid new students in procuring rooms and boarding places.

EXPENSES.

THE TUITION IS FREE in all the University classes, for matriculated students.

THE MATRICULATION FEE entitles the student to membership in the University until he completes his studies, and is..... $10 00

THE DIPLOMA FEE, payable before graduation, is..... 5 00

THE TERM FEE, for incidental expenses, is, for each student, except in Graduate School..... 7 50

THE TUITION FEE, for all special students (except in music), and for pupils of the Preparatory School, per term, is..... 5 00

THE MUSIC FEES ARE—

Piano instruction, ten weeks—2 lessons a week..... 15 00
Ten weeks—1 lesson a week..... 8 00
Use of piano, one hour daily, per term..... 2 00
Vocal instruction, ten weeks—2 lessons a week..... 20 00
Ten weeks—1 lesson a week..... 12 00

No deduction on account of absence in either course, except in case of protracted illness.

Each student working in laboratories, or in the draughting or engineering classes, is required to make a deposit varying from 50 cents to $10, to pay for chemicals and apparatus used, and for any breakages or damages.

ALL BILLS due the University *must be paid within ten days after the student enters classes.*

ESTIMATES OF EXPENSES.

The following are estimated minimum and maximum annual expenses, exclusive of books, clothing, railroad fare, laboratory fees, if any, and small miscellaneous needs.

Term fees.....	$22 50	$22 50
Room rent for each student (two in a room) ...	22 50	50 00
Table board in boarding houses and clubs.....	90 00	126 00
Fuel and light.....	10 00	15 00
Washing at 60 cents per dozen	12 00	18 00
Total.....	$157 00	$231 50
Board and room in private houses, per week....	4 00	6 00

CAUTION TO PARENTS—STUDENTS' FUNDS.

The Business Agent will receive on deposit any funds parents may intrust to him to meet the expenses of their sons and

daughters. *No greater error can be committed than to send young people from home with large amounts of spending money*, without the authoritative care of some prudent friend. Half the dissipation in colleges springs from excessive allowances of money. Students have little real need for money beyond that required for fees, board bills, and books. The attention of parents and guardians is earnestly requested to this matter, and especially in the case of those students who are under age.

PREPARATORY SCHOOL.

INSTRUCTORS.

Edward G. Howe, *Principal*, Natural Science.
Charles M. Moss, Ph.D., Greek.
Herman S Piatt, A.M., French.
Nathan A. Weston, B.L., History and Geometry.
Ralph P. Smith, Ph.B., German.
Adelle Clendenin, English.
Ola C Woolsey, B.A., Latin.
Walter S. McGee, B.S., Algebra.
Charles T. Wilder, B.S., Assistant in Natural Science.
Marion Thompson, Algebra.

This school has a permanent organization, with an efficient corps of instructors and ample equipment for thorough work along those lines which will best prepare the student for the University. The school offers special advantages to young men and women who, on account of advanced age or prolonged absence from school, are out of touch with the high school.

ADMISSION.

Candidates for admission must be at least fifteen years of age, and must pass satisfactory examinations in the following subjects:

1. ARITHMETIC.—A thorough knowledge is required of fundamental operations, simple and denominate numbers, metric system of weights and measures, common and decimal fractions, practical measurements, percentage, ratio, and proportion.

2. ENGLISH.—The examination is intended to test the student's vocabulary and his knowledge of grammar.

3. GEOGRAPHY.—An accurate knowledge of elementary, physical, and political geography is required.

4. HISTORY.—As a foundation in this subject, a knowledge of the early settlement of North America and of the growth and development of the United States is required. The mode of instruction should be such as to lead to a knowledge of the

development of the forces active in American life rather than the memorization of isolated dates and names.

Entrance should be made at the opening of the term. Examinations are held in the rooms of the school. For the fall term, 1895, these examinations occur on Thursday, Friday, and Saturday, the 5th, 6th, and 7th of September; for the winter and spring terms, on the two days previous to the opening of each term. Examinations on these dates are free, but for examinations at other times a fee of three dollars is charged.

Examinations may be conducted in Illinois by county superintendents of schools in the same manner as for teacher's certificates and their favorable reports will be accepted for entrance. First or second grade teachers' certificates from superintendents in Illinois will be taken for the same purpose, as will also certificates of the accomplishment of not less then one full year's work in an accredited high school of the University.

COURSE OF STUDY.

The time necessary for any particular student to complete the course offered is not fixed, but depends on his ability and previous training. Applicants for admission are permitted to enter the course at the beginning of any term if they have done the previous work required. Preparatory students are required, generally, to carry four studies, one of which should be such as needs but little work outside of the class room. The number varies, however, with the ability of the student and the nature of the course.

SUBJECTS OFFERED.

Fall Term.	*Winter Term.*	*Spring Term.*
Drawing.		
History.	History.	History.
	Language.	
English.	English.	English.
French.	French.	French.
Greek.	Greek.	Greek.
German.	German.	German.
Latin.	Latin.	Latin.

Mathematics.

Algebra.	Algebra.	Algebra.
Geometry.	Geometry.	Geometry.

Science.

Physiology.	Zoölogy.	Botany.
————	Physics.	Physics.

Students must choose from the above list such studies as they require for their chosen courses in the University, taking those under each head in the order given, except the optional languages and sciences. (See requirements for admission, p. 182.)

GENERAL PLAN OF INSTRUCTION.

ALGEBRA.

Rapidity and accuracy in all operations is rigidly required. Special emphasis is laid upon the use of purely literal expressions, radicals, fractional and negative exponents, and upon the fundamental nature of the equation. *Wells's Higher Algebra.*

By terms the work is divided as follows:

1. Fundamental processes, factoring, divisors, and multiples, fractions, and simple equations, with one and two unknown quantities.

2. Involution and evolution, theory of exponents, radicals, and quadratic equations.

3. Theory of quadratic equations, inequalities, theory of limits, ratio and proportion, variation, the progressions, etc.

BOTANY.

This is a study of plants rather than of books about plants, although books are not disregarded. It is an introduction to the science, giving to those who go farther in it a general acquaintance with the chief features of the vegetable kingdom, and to others, the required preparations for future work. The analysis of simple flowers forms a part of the work, and the preparation of a small herbarium of correctly named and properly mounted plants is required. *Bastin's Elements of Botany*, with any standard manual.

English.

The subject is presented in such a way as to increase the student's vocabulary and to develop elegance and exactness of expression in his composition. Grammar and rhetoric are taught in connection with this work. The study of literary masterpieces is also provided for both in order to furnish material for written exercises and to cultivate a taste for helpful books. Considerable collateral reading in English and American authors is therefore required.

The work by terms is as follows:

FIRST YEAR.

1. Review of Whitney's Grammar. Composition. Reading—The works required for admission to the University.

2. Genung's Outlines of Rhetoric. Composition. Reading—The works required for admission to the University.

3. Genung's Outlines of Rhetoric completed. Composition. Reading—The works required for admission to the University.

SECOND YEAR.

1. American Literature. Composition. Reading—The works required for admission to the University.

2. American Literature. Composition. Reading—The works required for admission to the University.

3. American Literature. Composition. Reading—The works required for admission to the University.

French and German.

The study of these languages is begun because an early knowledge of them aids the University work especially in science and engineering. The inductive method of teaching is followed, grammatical work being, from the first, based upon selected portions of standard works. The languages themselves are used, as far as practicable, in the class room. *Joynes-Meissner's German Grammar*, with *Joynes's German Reader*, *Bernhardt's Im Zweilicht I.* *Van Daell's Beginning French* accompanied by suitable texts.

Free Hand Drawing.

This is taught in the first term in order that pupils may have the benefit of the training in the studies which follow. *Frederick's Notes on Free Hand Drawing.*

Geometry.

Special attention is paid to the development of the idea of mathematical demonstration; and, as many students who can reason logically can not express their ideas clearly, due attention is paid to correctness of form. As soon as the student has attained the art of rigorous demonstration, he is required to produce constructions and demonstrations for himself. *Wells's Plane and Solid Geometry.*

The work by terms is as follows:

1. Plane Geometry, including rectilinear figures, the circle, similar polygons, areas of polygons, regular polygons and the measurement of the circle.

2. Solid Geometry, including lines and planes in space, dihedral and polyhedral angles, polyhedrons, the cylinder, cone, and sphere and their measurement.

3. Inventional Geometry, consisting of original work in construction and demonstration in the form of a general review.

Greek.

By terms the work is as follows:

FIRST YEAR.

1.—Goodwin's Greek Grammar with Frost's Greek Primer.

2.—Goodwin's Greek Grammar with Frost's Greek Primer, and Moss' First Greek Reader for translations.

3.—The Grammar and Xenophon's Anabasis with Collar and Daniel's Greek Prose Composition.

SECOND YEAR.

1.—Continuation of third term's work.

2.—The Grammar and selections from Xenophon's Hellenica with prose composition based on the text read.

3.—The Grammar and selections from Herodotus with prose composition based on the text read.

The authors named in the last four terms will not be insisted upon in the case of those offering Greek for entrance. An equivalent amount from any authors will be accepted. Ability to read at sight passages of average difficulty will be deemed of major importance.

History.

Instruction in this subject is confined to English and American history. A detailed study of the rise and progress of the

English speaking people in England and America is made, and considerable attention given to the origin and development of representative government. The work extends through one year, one half of the time being devoted to English, and the other half to American history.

The work, by terms, is as follows:

1. English History to the revolution of 1688.

2. English History from 1688 to the present time, and American History to the Revolutionary War.

3. American History from the Revolutionary War to the present time.

Latin.

The ground covered consists of the grammar and selections from Cæsar, Sallust, Cicero, and Vergil with the scansion of hexameter verse and the translation of English into Latin. The Roman method of pronunciation is used. *Allen and Greenough's Grammar* and *Collars' Latin Prose Composition.*

The work by terms is as follows:

FIRST YEAR.

1. Preparatory Latin Book; declensions and conjugations; practice in sight reading.

2. First half the term, Preparatory Latin book; second half the term, Viri Romæ and drill in constructions.

3. Arrowsmith and Whitcher's Selections, and syntax of the verb.

SECOND YEAR.

1. Cæsar. 2. Sallust. 3. Cicero.

THIRD YEAR.

1. Cicero. 2. Vergil. 3. Vergil.

PHYSICS.

This study is presented so as to cultivate habits of careful observation and to develop in the student the ability to reach general conclusions inductively by means of exact experiment. In all laboratory work the student is required to keep a note book containing a complete record of experiments performed. The work is begun in the winter term. *Allen's Laboratory Physics* with some standard text for study and reference.

The work by terms is as follows:

1. Magnetism, voltaic electricity, mensuration, density, and specific gravity.

2. Heat, dynamics, light and sound.

Physiology.

This science is taken up first because it forms a suitable introduction to Zoölogy and is a subject on which students should be early informed. Charts, skeleton, manikin, and illustrative material from the lower animals are used. *Martin's Human Body.*

Zoölogy.

This study logically follows Physiology. Through the study of typical animals the subject is so presented as to lead the student to a knowledge of methods of scientific classification in the natural sciences.

REGULATIONS.

Reports regarding all non-resident, minor students, (and, upon request, regarding any others,) are sent to parents or guardians as soon as students are settled in their work, (by the end of the first month), and reports regarding all students are sent at the close of each term.

The calendar of the Preparatory School is the same as that of the University.

Concerning fees and expenses see page 197.

For special information with regard to the Preparatory School, address Edward G. Howe, Champaign, Illinois.

LIST OF STUDENTS.

GRADUATE SCHOOL.

Atkinson, Rev. William Dent, B.L., Hedding College, *Champaign*, Economics.
Carpenter, Harvey Irving, B.L., Univ. of Ill., *Champaign*, Hist. and Economics.
Burnham, Allen Cyrel, B. S., Michigan Agricultural Coll., *Urbana*, Mechanical Eng'g.
Chipman, Paul, B.S., Univ. of Ill., *Mt. Carmel*, Civil Engineering.
Clark, Amos Cable, B.S., Univ. of Ill., *Urbana*, Architecture.
Cummings, Rev. John William, Mt. St. Mary's Seminary, Cincinnati, *Champaign*, Eng. and Mod. Lang.
Gaut, Robert Eugene, B.S., Univ. of Ill., *Mt. Sterling*, Civil Engineering.
Hottes, Charles Frederick, B.S., Univ. of Ill. (Fellowship), *Mascoutah*, Natural Science.
McCaskrin, Louise Elizabeth, B. S., Univ. of Ill., *Rantoul*, Natural Science.
McCormick, Flora, B.L., Univ. of Ill., *Champaign*, Hist. and Economics.
McGee, Walter Scott, B. S., Univ. of Ill. (Fellowship), *Champaign*, Economics.
Miller, Grant Clark, B.S., Univ. of Ill. (Fellowship), *Rockford*, Architecture.
Palmer, Mrs. Anna Shattuck, B.L., Univ. of Ill., *Champaign*, Eng. and Mod. Lang.
Piatt, Herman S, A.M., Univ. of Ill., *Urbana*, Classical.
Seaman, George Washington, B.S., Univ. of Ill., *Beardstown*, Mechanical Eng'g.

Shawhan, Gertrude, B.L., Univ. of Ill., *Champaign*, Eng. and Mod. Lang.
Sim, Keturah, B. L., Univ. of Ill., *Urbana*, Eng. and Mod. Lang.
Weston, Nathan Austin, B.L., Univ. of Ill., *Champaign*, Economics and Hist.
Wood, Robert Alvin, B.S., Univ. of Ill. (Fellowship), *Champaign*, Mechanical Eng'g.
Woolsey, Ola C, B.L., Univ. of Ill. (Fellowship), *Polo*, Latin.

RESIDENT GRADUATES.

Barber, Alice May, B.S., Univ. of Ill., *Urbana*, Physical Culture.
Beach, Charles Worth, B. S., State Agricultural College, Colorado, *Lincoln, Neb.*, Civil Engineering.
Carson, Anne, B.S., Univ. of Ill., *Urbana*, Natural Science.
Coffeen, Fred Goldsmith, B.S., Univ. of Ill., *Champaign*, Chemistry.
Gulick, Edward Everett, B.L., Univ. of Ill., *Champaign*, Classical.
Jones, Isabelle, Univ. of Ill., *Champaign*, Art and Design.
Pillsbury, Arthur Low, B. S., Harvard Univ., *Urbana*, Architecture.
Seibert, Emma Effie, B.S., Univ. of Ill., *Riverdale*, Art and Design.
Smetters, John Lincoln, B. S., Knox Coll., *Waverly*, Civil Engineering.

SENIORS.

Arms, Herbert Clarke, *Chicago*, Architecture.
*Atkinson, John Thomas, *Wilmington*, Mechanical Eng'g.
Ayers, Clarence Otto, *Nashville*, Natural Science.
Bailey, Leonard Lionel, *Chicago*, Architectural Eng'g.
Barry, Charles, *Henry*, Mechanical Eng'g.
Bassett, John Benjamin, *Kewanee*, Civil Engineering.
Baum, Henry William, *Phoenix, Ariz.*, Civil Engineering.

*Deceased.

Beebe, Fred Albert,	*Wisner, Neb.*, Mechanical Eng'g.
Boon, William Guthrie,	*Armstrong*, Civil Engineering.
Bower, Robert Allan,	*Tolono*, Eng. and Mod. Lang.
Brenke, William Charles,	*Chicago*, Chemistry.
Burdick, Charles Baker,	*Sterling*, Municipal Engineering.
Burrill, William Thomas,	*Shelby, Neb.*, Architecture.
Burt, Henry Jackson,	*Urbana*, Civil Engineering.
Busey, Frank Lyman,	*Urbana*, Mechanical Eng'g.
Cairns, Cora Mae,	*Polo*, Eng. and Mod. Lang.
Call, Hortense,	*Urbana*, Natural Science.
Campbell, George Henry,	*Louisville*, Eng. and Mod. Lang.
Campbell, Walter Gilbert,	*Champaign*, Electrical Eng'g.
Capps, Earl Vanhise,	*Mt. Pulaski*, Electrical Eng'g.
Carberry, Ray Shepard,	*Mansfield*, Civil Engineering.
Carmack, Clyde Robert,	*Camargo*, Mechanical Eng'g.
Clement, Clarence Adelbert,	*Tiskilwa*, Municipal Eng'g.
Clinton, John DeWitt,	*Polo*, Chemistry.
Cole, Mary Maude,	*Rantoul*, Latin.
Dillon, William Henry,	*Normal*, Architectural Eng'g.
Donnan, Alexander,	*Independence, Ia.*, Architecture.
Duffy, Sherman,	*Ottawa*, Latin.
Evans, Robert Herman,	*Bloomington*, Architecture.
Fellheimer, Alfred,	*Chicago*, Architecture.
Ferris, Arthur Timothy,	*Galesburg*, Classical.
Ferris, Joel Edward,	*Carthage*, Classical.
Folger, Rachel Ellen,	*Ridge Farm*, Natural Science.
Forbes, Bertha Van Hoesen,	*Urbana*, Natural Science.
Fouts, Lewis Hayden,	*Urbana*, Eng. and Mod. Lang.
Funston, Jesse Grant,	*Champaign*, Electrical Eng'g.
Green, James Albert,	*Ivesdale*, Mechanical Eng'g.
Green, Marianna,	*Ramsay*, Eng. and Mod. Lang.
Hall, Emery Stanford,	*Urbana*, Architecture.
Harms, Armin,	*Rock Island*, Chemistry.
Hempel, Adolph,	*Champaign*, Natural Science.
Hiles, Elmer Kirkpatrick,	*Chicago*, Mechanical Eng'g.
Hoag, Parker Hale,	*Champaign*, Classical.
Holtzman, Stephen Ford,	*Pontiac*, Architectural Eng'g.
Honens, Fred William,	*Milan*, Civil Engineering.
Hunt, Ernest Alexander,	*Urbana*, Electrical Eng'g.
Junkersfield, Peter,	*Sadorus*, Electrical Eng'g.
Keeler, Frederick Blair,	*Earlville*, Architecture.

Kent, Louis Maxwell,	*Danville*,	Eng. and Mod. Lang.
Ketchum, Milo Smith,	*Elmwood*,	Civil Engineering.
Ketchum, Richard Bird,	*La Prairie*,	Civil Engineering.
Kimball, William Haven,	*Chicago*,	Electrical Eng'g.
King, Francis Edward,	*White Hall*,	Eng. and Mod. Lang.
Lake, Edward John,	*Viroqua, Wis.*,	Architecture.
Lemen, William Clarence Smith,	*Uniontown, Ky.*,	Civil Eng'g.
Llewellyn, David Rossiter,	*Sterling*,	Mechanical Eng'g.
Long, Albert Milton,	*Virden*,	Architecture.
Mann, Edward Loring,	*Gilman*,	Eng. and Mod. Lang.
Marsh, Horatio Richmond,	*Joliet*,	Natural Science.
Mather, Fred Elbert,	*Naperville*,	Architecture.
Maxon, Robbins Yale,	*Danville*,	Civil Engineering.
Moore, Grace Lillian,	*Tolono*,	Natural Science.
Morrison, William Robert,	*Joliet*,	Architecture.
Munn, Alexander Majors,	*Swift, Neb.*,	Civil Engineering.
Noble, Charles William,	*Chicago*,	Architecture.
Noble, William,	*Champaign*,	Classical.
Pillsbury, Bertha Marion,	*Urbana*,	Classical.
Quade, John Conrad,	*Moline*,	Civil Engineering.
Reely, Thomas Washington,	*Spring Green, Wis.*,	Architecture.
Reeves, Harley Edson,	*Urbana*,	Civil Engineering.
Rowe, Herbert Brunskill,	*Redmon*,	Chemistry.
Royer, Joseph William,	*Urbana*,	Architecture.
Roysdon, William Ira,	*Champaign*,	Eng. and Mod. Lang.
Sayers, Albert Jefferson,	*Champaign*,	Mechanical Eng'g.
Scott, Daisy Coffin,	*Champaign*,	Latin.
Scott, William John,	*Champaign*,	Eng. and Mod. Lang.
Scurlock, Henry Harrison,	*Jackson, O.*,	Eng. and Mod. Lang.
Seastone, Charles Victor,	*New Boston*,	Civil Engineering.
Shepardson, John Eaton,	*Aurora*,	Civil Engineering.
Sparks, Marion Emeline,	*Urbana*,	Classical.
Spencer, Bertha,	*Decatur*,	Eng. and Mod. Lang.
Sperling, Godfrey,	*Dewey*,	Civil Engineering.
Stark, Robert Watt,	*Augusta*,	Chemistry.
Stewart, Mabel,	*Champaign*,	Natural Science.
Thomas, Homer,	*Kickapoo*,	Architectural Eng'g.
Thompson, Marion,	*Bement*,	Latin.
Vance, Walter Noble,	*Bement*,	Electrical Eng'g.
Vickery, Charles Roy,	*Dwight*,	Eng. and Mod. Lang.
Webster, Charles Carlton,	*Polo*,	Electrical Eng'g.

Weinshenk, Theodore,	*Champaign*,	Mechanical Eng'g.
White, Solon Marks,	*Sandwich*,	Natural Sciences.
Williams, Parker Merrill,	*Moline*,	Electrical Engineering.

JUNIORS.

Adams, Edward Langford,	*Austin*,	Electrical Engineering.
Alpiner, Amelia Darling,	*Kankakee*,	Eng. and Mod. Lang.
Ball, Elmer Newton,	*Mitchellville, Ia.*,	Architecture.
Banschbach, Edward Aaron,	*Princeton*,	Electrical Eng'g.
Beach, James George,	*Apalachin, N. Y.*,	Arch. Eng'g.
Begole, Joshua Franklin,	*O'Fallon*,	Mechanical Eng'g.
Bennett, Georgia E,	*Milford Center, O.*,	Chemistry.
Besore, Nellie,	*Urbana*,	Latin.
Boyd, George,	*Roseville*,	Civil Engineering.
Burke, William Henry,	*Champaign*,	Electrical Eng'g.
Carnahan, David Hobart,	*Champaign*,	Latin.
Chatten, Melville Clarke,	*Quincy*,	Architecture.
Chester, Wilfred Dudley,	*Champaign*,	Civil Engineering.
Clarke, Florence Besançon,	*Quincy*,	Chemistry.
Clover, Horace Nathaniel,	*Marengo*,	Electrical Eng'g.
Cooper, Paul Henry,	*Mendota*,	Electrical Eng'g.
Drake, Louis Sanford,	*Chicago*,	Eng. and Mod. Lang.
Dubsky, John Joseph, Jr.,	*Chicago*,	Civil Engineering.
Durstine, Warren Edward,	*Rock Falls*,	Electrical Eng'g.
Estee, Henry Clarence,	*Gibson City*,	Civil Engineering.
Everett, Frank Milton,	*Quincy*,	Electrical Engineering.
Fitzwilliam, Frank Joel,	*Bloomington*,	Architecture.
Gabelman, Julius Gordon,	*Okawville*,	Civil Engineering.
Gamble, Samuel Wesley,	*Chicago*,	Architectural Eng'g.
Ganung, Howard D,	*N. Fairfield, O.*,	Architecture.
Gazzolo, Frank Henry Serafino,	*Chicago*,	Chemistry.
Graham, Hugh Peter,	*Illiopolis*,	Civil Engineering.
Green, Frank Hopkins,	*Ivesdale*,	Mechanical Eng'g.
Green, Herbert John,	*Kewance*,	Architecture.
Hamilton, Frank Henry,	*Springfield*,	Civil Engineering.
Haskell, Howard Hall,	*Mendota*,	Electrical Eng'g.
Hindman, John,	*Champaign*,	Eng. and Mod. Lang.
Hottes, Henry Gustav,	*Mascoutah*,	Architecture.
Hubbard, George David,	*Urbana*,	Natural Science.
Huff, George A, Jr.,	*Englewood*,	Natural Science.

Jobst, George J,	*Peoria*,	Civil Engineering.
Johnson, Lewis Williams	*Champaign*,	Eng. and Mod. Lang.
Jones, Fred R,	*Neponset*,	Mechanical Eng'g.
Keeler, Harry,	*Chicago*,	Chemistry.
Kiler, Aureka Bell,	*Urbana*,	Eng. and Mod. Lang.
King, Wesley Edward,	*Champaign*,	Eng. and Mod. Lang.
Klossowski, Theodore Julius,	*Dixon*,	Civil Engineering.
Leal, Sophie,	*Urbana*,	Latin.
Lewis, Charles Milton,	*Blue Mound*,	Architecture.
Liese, George Charles,	*Nashville*,	Architecture.
Linn, Homer Roberts,	*Byron*,	Mechanical Eng'g.
Ludwick, George Washington,	*St. Joseph*,	Architecture.
Lyons, Timothy John,	*Sadorus*,	Eng. and Mod. Lang.
*McGregor, Leonard Allen,	*Earlville*,	Architecture.
McKee, James Harry,	*Fernwood*,	Mechanical Eng'g.
Manard, Robert Payton,	*Rockford*,	Architecture.
Marble, Harry Curtiss,	*Champaign*,	Electrical Eng'g.
Mason, William Charles,	*Ripon, Wis.*,	Architecture.
Mather, Althea S,	*Joliet*,	Eng. and Mod. Lang.
Mell, Joseph Leonard,	*San Jose*,	Civil Engineering.
Milne, Edward Lawrence,	*Orange, N. J.*,	Mathematics.
Moore, Minnie Rose,	*Peoria*,	Eng. and Mod. Lang.
Morgan, Walter Montgomery,	*Kinmundy*,	Eng. and Mod. Lang.
Morse, Jeddidiah D,	*Champaign*,	Electrical Eng'g.
Morse, Samuel Theodore,	*Carlinville*,	Civil Engineering.
Myers, James William,	*Chrisman*,	Eng. and Mod. Lang.
Noble, Harry Charles,	*Champaign*,	Eng. and Mod. Lang.
Noble, Isabelle,	*Urbana*,	Eng. and Mod. Lang.
Noble, Mary Elizabeth,	*Urbana*,	Latin.
Ogiwara, Chijokichi,	*Tokio, Japan*,	Mechanical Eng'g.
Orr, Edward Ellsworth,	*Quincy*,	Architecture.
Oyler, Harry Schuyler,	*Mt. Pulaski*,	Chemistry.
Perkins, Allie Christian,	*Tolono*,	Electrical Engineering.
Pfeffer, John Edward,	*Bondville*,	Electrical Eng'g.
Phelps, George Budd,	*Carlinville*,	Architecture.
Porter, Robert Knight,	*Champaign*,	Classical.
Powell, John Ellsworth,	*Powellton*,	Civil Engineering.
Reasoner, Mathew Aaron,	*Fisher*,	Chemistry.
Risor, Cady Alvern,	*Eureka*,	Electrical Engineering.
Row, George Edward,	*Centralia*,	Mechanical Eng'g.
Sammis, John Langley,	*Jacksonville*,	Chemistry.

*Deceased.

Saunders, Harry J,	*Chicago*,	Chemistry.
Sayers, William, Wesley,	*Champaign*,	Mechanical Eng'g.
Scott, George Harvey.	*Rantoul*.	Eng. and Mod. Lang.
Shea, John Clark,	*Danville*,	Electrical Eng'g.
Simons, Alexander Martin,	*Quincy*.	Electrical Eng'g.
Smith, Louie Henrie,	*Crystal Lake*,	Chemistry.
States, William Daniel,	*Elwood*,	Mechanical Eng'g.
Steele, William LaBarthe,	*Springfield*,	Architecture.
Stone, Percy Allyn,	*Bradfordton*,	Electrical Eng'g.
Sweney, Don,	*Gettysburg, Pa.*,	Mech. Eng'g.
Teeple, Wallace Douglas,	*Marengo*.	Architecture.
Thompson, Fred Lawrence,	*Isabel*,	Civil Engineering.
Tilton, Harry William,	*Mt. Carmel*,	Electrical Eng'g.
Van Orstrand, Charles Edwin,	*Pekin*,	Civil Engineering.
de Vries, Steven George,	*Pekin*,	Electrical Engineering.
Wakefield, George Mighell,	*Waterman*,	Electrical Eng'g.
Wharton, Rebecca Gaskin,	*Payson*.	Eng. and Mod. Lang.
Whitham, Myron Elwin,	*Warren*,	Electrical Eng'g.
Whittemore, Floyd,	*Sycamore*,	Electrical Eng'g.
Wills, George Arthur,	*Chicago*.	Electrical Eng'g.
Wills, Oscar T.	*Mendota*.	Electrical Eng'g.
Zimmerman, Walter,	*Champaign*.	Mechanical Eng'g.

SOPHOMORES.

Anderson, George Forbes,	*Carbondale*,	Civil Engineering.
Armstrong, James Ellis,	*Bondville*,	Eng. and Mod. Lang.
Armstrong, John Walter,	*Champaign*,	Natural Science.
Barr, George Andrew,	*Wilton Center*,	Eng. and Mod. Lang.
Beadle, Thomas B,	*Kewanee*,	Chemistry.
Beal, Alvin Casey,	*Mt. Vernon*,	Agriculture.
Beasley, Abel Harwood,	*Champaign*,	Chemistry.
Beckman, William Henry,	*Arthur*,	Eng. and Mod. Lang.
Beebe, Charles David,	*Evanston*,	Mechanical Eng'g.
Beem, Fred Clarkson,	*Ottawa*,	Architecture.
Blakslee, James Woodbury,	*Kinmundy*.	Eng. and Mod. Lang.
Branch, James,	*Seymour*,	Pharmacy.
Brandt, Eugene Hermann,	*Appleton City, Mo.*,	Architecture.
Braucher, Ralph Waldo,	*Lincoln*,	Agriculture.
Brower, Lyle Ireneus,	*Champaign*.	Architecture.
Brower, Ralph Plumb,	*Champaign*,	Civil Engineering.
Brown, Walter Burrows,	*Rock Falls*,	Chemistry.

Brownlee, Mary Lavinia,	*Urbana*,	Latin.
Brubaker, William Arthur,	*Robinson*,	Architectural Eng'g.
Buck, Luella Eugenia,	*Champaign*,	Natural Science.
Burroughs, Edward,	*El Paso*,	Classical.
Campbell, Maude Permill,	*Champaign*,	Art and Design.
Capron, Frank Read,	*Carthage*,	Architecture.
Carpenter, Hubert Vinton,	*Argo*,	Electrical Eng'g.
Chester, Guy Jacob,	*Champaign*,	Electrical Eng'g.
Chester, Manly Earl,	*Champaign*,	Electrical Eng'g.
Clarke, Octave Besançon,	*Quincy*,	Electrical Eng'g.
Coffeen, Harry Clay,	*Champaign*,	Electrical Eng'g.
Crellin, Charles Virgil,	*Winfield, Ia.*	Electrical Eng'g.
Defrees, Frederick Bradley,	*Indianapolis, Ind.*,	Civil Eng'g.
Dewey, James Ansel,	*Urbana*,	Natural Science.
Dewey, Louise Sarah,	*Urbana*,	Natural Science.
Doney, Oliver Kinsey,	*Urbana*,	Classical.
Dull, William Raymond,	*Burlington, Kas.*,	Mech. Eng'g.
Dunaway, Arthur Newton,	*Ottawa*,	Civil Engineering.
Dunlap, Elmer Edgar,	*Columbus, Ind.*,	Architecture.
Errett, Harry Boyd,	*Kewanee*,	Architecture.
Everhart, Rollin Orlando,	*Pana*,	Classical.
Fergus, William Loveday,	*Chicago*,	Mechanical Eng'g.
Flanigan, Edwin Clark,	*Champaign*,	Natural Science.
Forbes, Ernest Browning.	*Urbana*,	Natural Science.
Forbes, Stuart Falconer,	*Urbana*,	Architecture.
Frees, Herman Edward,	*Chicago*,	Chemistry.
Gayman, Bert A,	*Champaign*,	Electrical Eng'g.
Gearhart, Orval Lee,	*Farmer City*,	Architect'l Eng'g.
Green, John Taylor,	*Frankfort, Ky.*,	Chemistry.
Grimes, George Lyman,	*Moline*,	Mechanical Eng'g.
Gulick, Clyde Denny,	*Champaign*,	Natural Science.
Hadsall, Harry Hugh,	*Wilmington*,	Civil Engineering.
Hamilton, LeRoy F,	*Kewance*,	Latin.
Hammers, Morgan J,	*Champaign*,	Mechanical Eng'g.
Harris, Effie Estelle,	*Champaign*,	Eng. and Mod. Lang.
Henry, Maude May,	*Oregon*,	Eng. and Mod. Lang.
Hobart, Albert Claude,	*Elgin*,	Civil Engineering.
Hopper, Georgia Etherton,	*Champaign*,	Eng. and Mod. Lang.
Horn, Carl John,	*Naperville*,	Architecture.
Howison, Charles,	*Sandwich*,	Architecture.
Hughes, Frank Alexis,	*Pueblo, Colo.*,	Civil Engineering.

Hunter, Benjamin Aikens	*Rockford*, Mechanical Eng'g.
Huston, Fred Thales,	*Blandinsville*, Natural Science.
Ice, Marinda,	*Gifford*, Eng. and Mod. Lang.
Ice, Meldora,	*Gifford*, Architecture.
Johnson, Martin Nathaniel,	*Moline*, Mechanical Eng'g.
Kiler, William Henry,	*Urbana*, Eng. and Mod. Lang.
Kinzel, Frederick August,	*Mattoon*, Classical.
Kirkpatrick, Harold H,	*Mayview*, Classical.
Kistner, Theodore Charles,	*Carlinville*, Architecture.
Kratz, Laura,	*Monticello*, Eng. and Mod. Lang.
Kuehne, Carl Oscar,	*Chicago*, Architecture.
Lantz, Simon Everett,	*Carlock*, Natural Science.
Larson, Charles Sigurd,	*Chicago*, Electrical Engineering.
Leigh, Charles Wilbur,	*La Prairie Center*, Mathematics.
Lilly, John Crozier,	*Champaign*, Natural Science.
Lindsay, Blanche,	*Onarga*, Eng. and Mod. Lang.
Lowes, Forrest Mitchison,	*Geneseo*, Latin.
McFadden, Belle Lorraine,	*Champaign*, Latin.
Mann, Arthur Richard,	*Gilman*, Mechanical Eng'g.
Manny, Fred Hugh,	*Mound Station*, Natural Science.
Marsh, Loren William,	*Joliet*, Electrical Engineering.
Marsh, Norman Foote,	*Upper Alton*, Architecture.
Masten, George Leroy,	*Woonsocket, S.D.*, Eng. and Mod. Lang.
Matteson, Victor André,	*Evanston*, Architecture.
Millar, Adam Vause,	*Mattoon*, Civil Engineering.
Munhall, Grace May,	*Champaign*, Eng. and Mod. Lang.
Murphy, Francis Joseph,	*Long Grove, Ia.*, Chemistry.
Naughton, Charles Colby,	*Champaign*, Chemistry.
Nelson, Fred Irwin,	*Buda*, Electrical Engineering.
Newcomer, Joseph Hardin,	*Petersburg*, Mechanical Eng'g.
Newcomer, Paul William,	*Petersburg*, Chemistry.
Northam, Lottie Alice,	*Nora*, Natural Science.
Norton, Belle,	*Urbana*, Eng. and Mod. Lang.
Nye, Carl Merriman,	*Moline*, Civil Engineering.
Nye, Robert,	*Moline*, Municipal Engineering.
Olmstead, Roy,	*Prophetstown*, Electrical Eng'g.
Paine, Arthur Elijah,	*Rosemond*, Classical.
Parr, John Louis,	*Wyoming, Wis.*, Architecture.
Paul, Arthur Ernest,	*Chicago*, Chemistry.
Pepper, William Allen,	*Joliet*, Electrical Engineering.
Peterson, Martin,	*Chicago*, Architecture.

Pirkins, Reed Miles,	*Springfield*,	Latin.
Pitney, Clarence Orville,	*Augusta*,	Natural Science.
Pohlman, John Edward,	*Joliet*,	Civil Engineering.
Poole, Edward Warren,	*Dover*,	Electrical Engineering.
Porter, Horace Chamberlain,	*Champaign*,	Classical.
Ray, George Joseph,	*El Paso*,	Civil Engineering.
Rayburn, Charles Clyde,	*Roseville*,	Chemistry.
Saunders, Rome Clark,	*Champaign*,	Electrical Eng'g.
Schacht, Frederick William,	*Moline*,	Natural Science.
Schroeder, John Lewis,	*Davenport, Ia.*,	Electrical Eng'g.
Searing, Charles Aaron,	*Oak Park*,	Architecture.
Shepardson, Ralph Steele,	*Aurora*,	Architecture.
Sherrill, Walter Dickens,	*Colona*,	Architecture.
Smith, Friend Orville,	*Ashton*,	Pharmacy.
Spencer, Fred Wilcox,	*Clinton, Ia.*,	Architect'l Eng'g,
Steinwedell, George Otto,	*Quincy*,	Electrical Engineering.
Stewart, Grace Adele,	*Champaign*.	Eng. and Mod. Lang.
Stoolman, Almond Winfield Scott,	*Champaign*,	Natural Science.
Terry, Charles Dutton,	*Kewanee*,	Mechanical Eng'g.
Trogdon, James Edmund,	*Paris*,	Electrical Engineering.
Vail, Richard Hart,	*Kewanee*,	Chemistry.
Van Meter, Seymour,	*Cantrall*,	Architecture.
Vigal, William Myron,	*Edinburg*,	Civil Engineering.
Wallace, Herbert Milford.	*Chicago*,	Eng. and. Mod. Lang.
Webber, Hubert Anthony,	*Mt. Vernon*,	Architectural Eng'g.
Webster, Sarah Emeline,	*Champaign*,	Art and Design.
Wheldon, Clarence Sutton,	*Emporia, Kansas.*,	Elect. Eng'g.
Willett, William Marble,	*Yorkville*,	Electrical Eng'g.
Williamson, Albert St. John,	*Quincy*,	Mechanical Eng'g.
Woody, Frederick Way,	*Champaign*,	Municipal Eng'g.
Wray, David Couden,	*Elida*,	Civil Engineering
Young, Charles Whittier,	*Chicago*,	Natural Science.
Young, John Hayes,	*Chicago*,	Electrical Eng'g.
Zilly, Mabel Helen,	*Champaign*,	Latin.

FRESHMEN.

Aaron, Philip Judy,	*Big Neck*,	Electrical Eng'g.
Allen, Lewis Richard,	*Carbondale*,	Mechanical Eng'g.
Anderson, Clark Godfrey,	*Moline*,	Civil Engineering.
Armstrong, James Wadsworth,	*Cedar Rapids, Ia.*,	Architecture.
Arnold, Jay Jennings,	*Springfield*,	Natural Science.

Bagshaw, William Leroy,	*Winchester*,	Architecture.
Barnhart, John Carns,	*Rock Island*,	Eng. and Mod. Lang.
Beach, Wilfred Warren,	*Sioux City, Ia.*,	Architecture.
Beasley, D Edith,	*Urbana*,	Eng. and Mod. Lang.
Beatty, John Wirts,	*Delavan*,	Eng. and Mod. Lang.
Beekman, Jonathan Colby,	*Petersburg*,	Civil Engineering.
Benham, Cassius Earl,	*LaGrange, Ind.*,	Electrical Eng'g.
Berry, Erwin Howard,	*Paw Paw*,	Chemistry.
Bigelow, Mary Constance,	*Champaign*,	Mathematics.
Bocock, Clarence Edgar,	*Bradford*,	Eng. and Mod. Lang.
Booker, Lucile Alice,	*Champaign*,	Eng. and Mod. Lang.
Breidert, Henry Cyrille	*Havana*,	Civil Engineering.
Brown, Arthur Artemas,	*Westfield, Mass.*,	Mech. Eng'g.
Bunn, Walter Pennington,	*Golconda*,	Natural Science.
Burkland, Theodore Leonard,	*Moline*,	Civil Engineering.
Burnham, Robert Davison,	*Champaign*,	Eng. and Mod. Lang.
Busey, Laura,	*Urbana*,	Eng. and Mod. Lang.
Busey, Marietta Ruth,	*Urbana*,	Eng. and Mod. Lang.
Cable, Wickliffe Isaac,	*Chicago*,	Eng. and Mod. Lang.
Chilton, James Frank,	*Charleston*,	Electrical Eng'g.
Clark, Charles Albert,	*Vandalia*,	Electrical Eng'g.
Clark, Charles Richard,	*Bloomington*,	Architect. Eng'g.
Clark, Edith,	*Vandalia*,	Classical.
Clark, Winfred Newcomb,	*Paxton*,	Electrical Eng'g.
Clayton, Thomas Wiley,	*Dixon*,	Civil Engineering.
Coad, Robert Ewing,	*Livermore, Pa.*,	Electrical Eng'g.
Collins, Edgar Francis,	*Farmer City*,	Electrical Eng'g.
Collins, William Copeland,	*Keokuk, Ia.*,	Electrical Eng'g.
Combs, James Rockwell,	*Ottawa*,	Mechanical Eng'g.
Conn, Ida May,	*Shelbyville*,	Eng. and Mod. Lang.
Connell, Richard D,	*Delavan*,	Architecture.
Cooper, Edgar Cook,	*Mendota*,	Civil Engineering.
Corbus, Burton Robison,	*LaSalle*,	Natural Science.
Craig, Wallace,	*Chicago*,	Natural Science.
Crathorne, Arthur R,	*Jacksonville*,	Electrical Eng'g.
Curtis, William,	*Delavan*,	Agriculture.
Darmer, George Alexander,	*Champaign*,	Natural Science.
Davis, Philip Henry,	*Rock Falls*,	Architectural Eng'g.
Davison, Chester Morton,	*Rock Falls*,	Architecture.
Dawson, Lele Iva,	*Champaign*,	Eng. and Mod. Lang.
Deming, Percy Corbus,	*Amboy*,	Architectural Eng'g.

Dickey, James Harvey,	*Argenta*,	Mathematics.
Dillon, William Wagner,	*Sheldon*,	Natural Science.
DuBois, Alexander Dawes,	*Springfield*,	Electrical Eng'g.
Dunkin, William Van,	*Urbana*,	Mechanical Eng'g.
Dunlap, Elmore Ray,	*Pontiac, Mich.*,	Architecture.
Durfee, Warren Taylor,	*Decatur*,	Electrical Eng'g.
Eckles, Harry Edward,	*Newcastle, Pa.*,	Civil Eng'g.
Enochs, Claude Douglass,	*Champaign*,	Electrical Eng'g.
Enochs, Delbert Riner,	*Champaign*,	Classical.
Evans, Ray C.,	*El Paso*,	Mechanical Eng'g.
Ferguson, Eugene Ray,	*Lake Charles, La.*,	Mech'l Eng'g.
Fetzer, William Ray,	*Ottawa*,	Eng. and Mod. Lang.
Fischer, Louis Englemann,	*Shiloh*,	Civil Eng'g.
Fisher, Pearl,	*Savoy*,	Eng. and Mod. Lang.
Folger, Lottie Ruth,	*Ridge Farm*,	Natural Science.
Forman, Charles William,	*Nashville*,	Eng. and Mod. Lang.
Fox, Fred Gates,	*Peru*,	Eng. and Mod. Lang.
Frazey, Alice Belle,	*Urbana*,	Eng. and Mod. Lang.
Fullenwider, Arthur Edwin,	*Mechanicsburg*,	Architecture.
Fulton, William John,	*Hartford City, Ind.*,	Eng. and Mod. Lang.
Garrett, Thomas B,	*Golden*,	Electrical Engineering.
Gardner, Frank Arthur,	*Osceola*,	Mechanical Eng'g.
Gaston, George Horace,	*Normal*,	Eng. and Mod. Lang.
Gebbie, Kelso Frank,	*Mascoutah*,	Electrical Eng'g.
Gerber, Winfred Dean,	*Rockford*,	Civil Engineering.
Gernand, William Isaac,	*Rossville*,	Electrical Eng'g.
Gilchrist, Francis Foster,	*Chicago*,	Chemistry.
Glandon, Edgar Dale,	*Brooklyn*,	Electrical Eng'g.
Goodridge, Henry Anthony,	*Chicago*,	Electrical Eng'g.
Graham, George Woods,	*Freeport*,	Civil Engineering.
Gray, Shirley Eugene,	*Griggsville*,	Chemistry.
Hair, Charles Ernest,	*Galesburg*,	Architectural Eng'g.
Hall, Louis Dixon,	*Hawarden, Ia.*,	Mech. Eng'g.
Hamm, Ira Lewis,	*El Paso*,	Mechanical Eng'g.
Hatch, Thomas Milford,	*Goshen, Ind.*,	Electrical Eng'g.
Hawker, Frank Allen,	*Urbana*,	Electrical Engineering.
Hay, Mark,	*Champaign*,	Architecture.
Hayes, James Benjamin,	*Riverton*,	Classical.
Hays, Don,	*Sidney*,	Civil Engineering.
Hazlitt, Albert Nichols,	*Ottawa*,	Architecture.

Helton, Alfred Joseph,	*Atwood*,	Eng. and Mod. Lang.
Henninger, Carl Gustave,	*Eddyville, Ia.*,	Architecture.
Herren, Harry,	*Fillmore*,	Civil Engineering.
Herwig, John Newton,	*Mason City*,	Mechanical Eng'g.
Higgins, Frank Leonard,	*Elmwood*,	Mechanical Eng'g.
Hill, Irwin Horatio,	*Joliet*,	Architecture.
Hiller, George Myers,	*Kohoka, Mo.*,	Classical.
Hoagland, John King,	*Shelbyville*,	Agriculture.
Holcomb, Arthur Hiram,	*Sycamore*,	Mechanical Eng'g.
Hotchkiss, Robert James,	*Peoria*,	Architecture.
Houck, George, Sims,	*Pontiac*,	Mechanical Eng'g.
Houghton, William Daniel,	*Mattoon*,	Classical.
House, Leone Pearl,	*Sadorus*,	Latin.
Howard, Hartwell Carver, Jr.,	*Champaign*,	Natural Science.
Hudson, Isaac Beasly,	*Cairo*,	Latin.
Hughes, Arlington H,	*Mattoon*,	Latin.
Hurd, Arthur Burton,	*El Paso*,	Mechanical Eng'g.
Illingworth, Frank,	*Chicago*,	Civil Engineering.
Jackson, William John,	*Chicago*,	Civil Engineering.
James, William Henry,	*Paris*,	Architecture.
Jordon, George Horace,	*Indianapolis, Ind.*,	Architecture.
Jordan, Helen,	*Tolono*,	Latin.
Jordan, Theodore Nelson,	*Tolono*,	Mechanical Eng'g.
Judy, Herbert Bolivar,	*Troy, O.*,	Art and Design.
Kendall, James Blaine,	*Momence*,	Mechanical Eng'g.
Kingman, Charles Dudley,	*Mattoon*,	Civil Eng'g.
Kirkpatrick, Asa Baird,	*Elmwood*,	Natural Science.
Kruse, Conrad Fred,	*Davenport, Ia.*,	Architecture.
Lentz, Caroline,	*Arcola*,	Latin.
Liddy, Eugene,	*Red Bud*,	Civil Engineering.
Linn, Francis David,	*Byron*,	Agriculture.
Linzee, Albert Carl,	*DuQuoin*,	Electrical Eng'g.
McCarty, Charles James,	*Rock Falls*,	Electrical Eng'g.
McIntire, Merton Pearson,	*Neponset*,	Electrical Eng'g.
McIntyre, Charles E,	*Newman*,	Eng. and Mod. Lang.
McLennan, Alexander Richard,	*Urbana*,	Eng. and Mod. Lang.
Marshutz, Joseph Hunter,	*Shelbyville*,	Classical.
Marx, Maurice,	*Nashville*,	Electrical Eng'g.
Mathews, James Edward,	*Olney*,	Civil Engineering.
Maxwell, Irvine William,	*Savoy*,	Electrical Eng'g.
May, Harry Monroe,	*Rochelle*,	Electrical Eng'g.

Mellen, Ernest Roy,	*Amboy*,	Electrical Eng'g.
Merker, Henry Fleury,	*Belleville*,	Electrical Eng'g.
Mettler, Joseph Ferdinand,	*Rankin*,	Latin.
Mitchell, Frederick Alexander,	*Hillsboro*,	Electrical Eng'g.
Moore, Dwight Merritt,	*Monticello*,	Electrical Eng'g.
Morrow, Grace Eliot,	*Champaign*,	Natural Science.
Muse, Ernest,	*Metropolis*,	Architecture.
Neureuther, Andrew Henry,	*Peru*,	Mechanical Eng'g.
Nevins, John,	*Camp Point*,	Electrical Eng'g.
Nicholson, James Calvin,	*Litchfield*,	Mechanical Eng'g.
Noble, Robert William,	*Urbana*,	Eng. and Mod. Lang.
O'Rourke, Eugene James,	*LaSalle*,	Chemistry.
von Oven, Frederick William,	*Naperville*,	Civil Eng'g.
Owens, Daisy Margaret.	*Urbana*,	Natural Science.
Parker, George Arthur,	*Champaign*,	Mechanical Eng'g.
Paul, Elmer Christian,	*Peoria*,	Chemistry.
Pease, Henry Mark,	*Malta*,	Electrical Eng'g.
Perry, James Alfred.	*Woodstock*,	Electrical Eng'g.
Philips, Thomas Lewis,	*Mt. Carroll*,	Eng. and Mod. Lang.
Plym, Francis John,	*Aledo*,	Architecture.
Polk, Cicero Justice,	*Arcola*,	Classical.
Ponzer, Ernest William,	*Henry*,	Mechanical Engineering.
Pooley, William Vipond,	*Galena*,	Latin.
Raynor, Clara Mae,	*Champaign*,	Classical.
Reat, Fred Lee,	*Tuscola*,	Latin.
Reinhardt, Julius Emil,	*Chicago*,	Mechanical Eng'g.
Rhodes, Ora M,	*Bloomington*,	Electrical Eng'g.
Richards, Clarence Morgan,	*Urbana*,	Mechanical Eng'g.
Ritchey, Felix,	*Cadwell*,	Eng. and Mod. Lang.
Ritchie, Andrew,	*Foosland*,	Civil Engineering.
Rodgers, Leon L,	*Riverton*,	Civil Engineering.
Rohrer, Edward Curtiss,	*Waverly*,	Electrical Eng'g.
Ross, Herbert Austin,	*Jerseyville*,	Chemistry.
Rutherford, Cyrus Wilson,	*Newman*,	Pharmacy.
Schneiter, Samuel,	*Paxton*,	Eng. and Mod. Lang.
Shless, Charles,	*Chicago*,	Eng. and Mod. Lang.
Sims, Mary,	*Lincoln*,	Eng. and Mod Lang.
Slater, Henry Herbert,	*Harristown*,	Natural Science.
Smetters, McCormick,	*Waverly*,	Agriculture.
Smith, Joseph Clay,	*Cairo*,	Pharmacy.
Snyder, Karl Forbes,	*Riverside*,	Electrical Eng'g.

Soper, Stanley Livingston,	*Champaign*,	Latin.
Staley, Joseph Clarence,	*Urbana*,	Classical.
Stone, Albert James,	*Quincy*,	Mechanical Eng'g.
Sunderland, Archer Henry,	*Delavan*,	Electrical Eng'g.
Swartz, William Commodore,	*Urbana*,	Classical.
Tate, Everett Lewis,	*Pontiac*,	Mechanical Eng'g.
Thayer, Albert Lewis,	*New Castle, Pa.*,	Architecture
Thompson, Guy Andrew,	*Steward*,	Eng. and Mod. Lang.
Thornhill, Charles Calaware,	*Champaign*,	Mechanical Eng'g.
Toenniges, Ferdinand Frederick Emil,	*Davenport, Ia.*,	Civil Engineering.
Twyman, Frank,	*Macomb*,	Architectural Eng'g.
Uppendahl, William John,	*Dalton City*,	Eng. and Mod. Lang.
Vandaveer, Jennings,	*Evanston*,	Electrical Eng'g.
VanHorn, Merton Gates,	*Plainfield*,	Chemistry.
VanPatten, Seth Field,	*Steward*,	Eng. and Mod. Lang.
Wade, Thomas Brian,	*Champaign*,	Natural Science.
Walker, Rufus, Jr.,	*Moline*,	Eng. and Mod. Lang.
Wallace, John Edgar,	*Neoga*,	Mechanical Engineering.
Walter, Charles Albert,	*Sandwich*,	Chemistry.
Webster, Joshua Percy,	*Philadelphia, Pa.*,	Arch. Eng'g.
Weirick, Ralph Wilson,	*Washington*,	Eng. and Mod. Lang.
Wernham, James Ingersoll,	*Marengo*,	Chemistry.
West, Roy Charles,	*Sycamore*,	Pharmacy.
Wharf, Allison James,	*Olney*,	Civil Engineering.
White, Harry,	*Newman*,	Natural Science.
Wilson, Frederick Henry,	*Evanston*,	Electrical Eng'g.
Wingard, Lewis Forney,	*Champaign*,	Eng. and Mod. Lang.
Wolcott, James Thompson,	*Peoria*,	Chemistry.
Woodworth, Minnie Barney,	*Champaign*,	Latin.
Worthen, George Bedell,	*Warsaw*,	Natural Science.
Wuerffel, Herman Louis,	*South Chicago*,	Electrical Eng'g.
Yeomans, Edith Marian,	*Danville*,	Chemistry.
Zink, George,	*Litchfield*,	Chemistry.

SPECIAL.

Allen, Rev. Basil Louis,	*Champaign*,	Classical.
Balding, James Palmer,	*Milwaukee, Wis.*,	Architecture.
Brennemann, Ernest,	*Peru*,	Eng. and Mod Lang.

Brode, Arletta Elizabeth,	*Urbana*,	Natural Science.
Brownlee, Elizabeth Emma,	*Urbana*,	Eng. and Mod. Lang.
Brubaker, Samuel H.,	*Mt. Morris*,	Architecture.
Camp, Emma Alice.	*Bement*,	Music.
Carter, Mabel Carrie.	*Champaign*,	Art and Design.
Chester, Edith,	*Champaign*,	Art and Design.
Craig, Robert Hanson,	*Charleston*,	Agriculture.
Davidson, Jessie Fuller,	*Galesburg*,	Architecture.
Draper, Charlotte,	*Urbana*,	Eng. and Mod. Lang.
Dukes, William Albert,	*Champaign*,	Pharmacy.
Dunlap, Helen Esther,	*Champaign*,	Art and Design.
Eklund, Henry,	*Kewanee*,	Architecture.
Fairchild, Oscar Harmon,	*Snyder*,	Chemistry.
Fletcher, Minerva,	*Girard*,	Eng and Mod. Lang.
Foster, Mrs. Charles William,	*Champaign*,	Eng and Mod. Lang.
Gere, Clara,	*Champaign*,	Eng and Mod. Lang.
Gingrich, Emma.	*Bentonville, Ind.*,	Eng. and Mod. Lang.
Granberry, Clara Estelle.	*Palestine, Miss.*,	Latin.
Grieme, Henry William,	*Amsterdam, N. Y.*,	Architectural Engineering.
Grinnell, Jessie Clare.	*Mayfair*,	Art and Design.
Hammers, Lilian,	*Champaign*,	Eng. and Mod. Lang.
Hanson, Mattie Alice,	*Urbana*,	Art and Design.
Havard, Jennie,	*Urbana*,	Music.
Hughes, Emma Edna,	*Adams*,	Eng. and Mod. Lang.
Kellam, Mary Beeson,	*Los Angeles, Cal.*,	Eng. and Mod. Lang.
Kerns, Effie S.	*Champaign*,	Eng. and Mod. Lang.
Leal, Mary Cloelia,	*Urbana*,	Art and Design.
Leoppert, Rev. Henry Christian,	*Champaign*,	Classical.
Miner, Earl Henry,	*Winchester*,	Electrical Eng'g.
Posey, Thomas,	*Peoria*,	Chemistry.
Postlethwaite, Francis William Henry,	*Toronto, Canada*,	Electrical Engineering.
Reaburn, DeWitt Lee,	*Fincastle, Va.*,	Civil Eng'g.
Reed, Charles Everett,	*Elmwood*,	Eng. and Mod. Lang.
Riley, Clarence Ninian,	*Urbana*,	Art and Design.
Riley, George Washington,	*Champaign*,	Art and Design.
Sconce, Harvey James,	*Sidell*,	Agriculture.
Seass, Lucas,	*Urbana*,	Eng. and Mod. Lang.

Shawhan, William Edward,	*Champaign*,	Civil Eng'g.
Smith, Fred McClellan,	*Virginia*,	Natural Science.
Snyder, Mary Jane,	*Champaign*,	Physical Culture.
Straight, Mae Lulu,	*Champaign*,	Eng. and Mod. Lang.
Sumner, William Thompson,	*Emden*,	Eng. and Mod. Lang.
Sweet, Frances D,	*Champaign*,	Eng. and Mod. Lang.
Wright, Marion,	*Urbana*,	Eng. and Mod. Lang.

PREPARATORY.

Adolph, Peter,	*San Jose*,	Mechanical Eng'g.
Alward, Carrie Louise,	*Canton*,	Eng. and Mod. Lang.
Appel, Henry Louis,	*Chicago*,	Architectural Eng'g.
Artz, David,	*Augusta*,	Pharmacy.
Bailey, Gertrude Hannah,	*Long View*,	Eng. and Mod. Lang.
Bassett, Minnie,	*Champaign*,	Natural Science.
Baum, Albert Lee,	*Carlyle*,	Electrical Engineering.
Beasley, Sally Louise,	*Champaign*,	Classical.
Berry, Edna May,	*Champaign*,	Classical.
Berry, Floy Elaine,	*Champaign*,	Classical.
Boggs, Oliver Carter,	*Urbana*,	Latin.
Bond, Dixon John,	*Taylorville*,	Electrical Eng'g.
Boring, Perry Josephus,	*New Berlin*,	Architecture.
Borovik, Benjamin M,	*Chicago*,	Natural Science.
Boyd, Bertha Marion,	*Roseville*,	Eng. and Mod. Lang.
Boyles, Rice,	*Louisville*,	Eng. and Mod. Lang.
Buck, Merryman Estes,	*Danvers*,	Electrical Engineering.
Bullard, Robert Irving,	*Mechanicsbury*,	Eng. and Mod. Lang.
Burleigh, Cornelius Howard,	*Champaign*,	Architectural Eng'g.
Burleigh, Otto Franklin,	*Champaign*,	Pharmacy.
Butler, Elmer Banks,	*Chicago*,	Mechanical Eng'g.
Butler, Harry Charles,	*Effingham*,	Mechanical Eng'g.
Byerly, Edna Gertrude,	*Urbana*,	Eng. and Mod. Lang.
Chambers, James Bloomfield,	*Riverside*,	Mechanical Eng'g.
Child, Henry,	*Farmingdale*,	Mechanical Eng'g.
Church, Floyd Franklin,	*Centralia*,	Mechanical Eng'g.
Clark, Howard Wallace,	*Quincy*,	Architecture.
Cox, Edna Leone,	*Vermont*,	Eng. and Mod. Lang.
Dawley, Mary Julia,	*Seymour*,	Natural Science.
Dieterich, William Frederick,	*Sandwich*,	Mechanical Eng'g.

Dinwiddie, Virginia,	*Champaign*,	Natural Science.
Dill, William,	*Little Rock, Ark.*,	Civil Eng'g.
Dolan, William John,	*Ohio*,	Classical.
Dunseth, James Morton,	*Urbana*,	Classical.
Fischer, Robert Ingersoll,	*Mendota*,	Architectural Eng'g.
Follansbee, Leslie Bennett,	*Quincy*,	Architecture.
Fowler, Robert Lambert,	*Charity*,	Civil Engineering.
Fithian, Sidney Breese,	*Newton*,	Eng. and Mod. Lang.
Freeman, Harry Eben,	*Millington*,	Latin.
Gell, John James,	*Gilchrist*,	Natural Science.
Gilchrist, Hugh McWhurr,	*Gilchrist*,	Civil Engineering.
Gilmer, Karl Rex,	*Urbana*,	Classical.
Ginzel, Roland Francis,	*Trenton*,	Architecture.
Gladson, Edythe Laura.	*Mason*,	Latin.
Gray, Olive Lyda,	*Champaign*,	Eng. and Mod. Lang.
Green, Don Roy,	*Effingham*,	Natural Science.
Greene, Mary Avery,	*Urbana*,	Classical.
Griffiths, John, Jr.,	*Chicago*,	Civil Eng'g.
Hagen, Peter,	*Wenona*,	Civil Eng'g.
Haldermann, Edwin McAfee,	*Mt. Carroll*,	Eng. and Mod. Lang.
Hall, Seymour Elbridge,	*Champaign*,	Eng. and Mod. Lang.
Hanson, Gertrude Lucile,	*Urbana*,	Latin.
Hanson, Rachelle Margheritta,	*Urbana*,	Natural Science.
Heath, Noble Porter,	*White Heath*,	Agriculture.
Haussner, Charles, Jr.,	*Chicago*,	Mechanical Eng'g.
Heller, Joseph Sanford,	*Mt. Pulaski*,	Eng. and Mod. Lang.
Hines, Edward George,	*Huey*,	Architecture.
Hippen, William,	*Pekin*,	Mechanical Eng'g.
Holden, James Allen,	*Aurora*,	Mechanical Eng'g.
Hopkins, Milton Irwin,	*Indianapolis, Ind.*,	Electrical Engineering.
Horner, Mattie May,	*Downs*,	Eng. and Mod. Lang.
Hougham, Frank B,	*Bellflower*,	Eng. and Mod. Lang.
Houser, William,	*Sadorus*,	Mathematics.
Ijams, Katherine Harriet,	*Urbana*,	Art and Design.
Irwin, Belle Blanche,	*Long View*,	Eng. and Mod. Lang.
Iungerich, Charles Rider.	*Urbana*,	Eng. and Mod. Lang.
Jackson, William E,	*Dawson*,	Agriculture.
Jacobson, Charles Herman,	*Englewood*,	Civil Engineering.
Kaeser, Albert F,	*Highland*,	Natural Science.
Lake, George Elbert,	*Williamsville*,	Agriculture.

Landauer, Leo Louis,	*Peru, Ind.*,	Mechanical Eng'g.
Latzer, John Albert,	*Highland*,	Agriculture.
Lee, Julian Liechaski,	*Memphis, Tenn.*,	Mechanical Engineering.
Leet, Arthur Allen,	*Chicago*,	Electrical Eng'g.
Leidendeker Albert Richard,	*Champaign*,	Agriculture.
Leutwiler, Oscar Adolph,	*Highland*,	Mechanical Eng'g.
Lietze, Frank,	*Carlyle*,	Architecture.
Lindenmeyer, Theodore Andrew,	*Buckley*,	Classical.
Lloyde, Clifford Luther,	*Champaign*,	Natural Science.
McCormick, Elsie Drene,	*Champaign*,	Eng. and Mod. Lang.
McGee, Charles Howard,	*Champaign*,	Natural Science.
McMillen, Maude,	*Monticello*,	Eng. and Mod. Lang.
Marker, William Franklin,	*Champaign*,	Architecture.
Miebach, Peter John,	*Champaign*,	Civil Eng'g.
Miller, Frank Alonzo,	*Rantoul*,	Classical.
Miller, Homer, Hanford,	*Bismarck*,	Classical.
Mills, Ralph Walter,	*Webster Groves, Mo.*,	Natural Science.
Mitchell, Lennie,	*Sidney*,	Architectural Eng'g.
Monroe, John,	*Charleston*,	Latin.
Morrissey, Matthew James,	*Champaign*,	Chemistry.
Morrison, George E,	*Urbana*,	Electrical Eng'g.
Morse, Robert Pope,	*Indianapolis, Ind.*,	Architecture.
Muller, Albert Charles,	*Chicago.*	Architecture.
Mundy, Robert Stephen,	*Champaign*,	Mechanical Eng'g.
Nabstedt, Frederick,	*Davenport, Ia.*,	Electrical Eng'g.
Newell, Mason Harder,	*Springfield*,	Eng. and Mod. Lang.
Nickoley, Edward Frederick,	*Long Grove*,	Pharmacy.
Paddack, Caddie,	*Smith's Valley*,	Natural Science.
Paddack, Nettie,	*Smith's Valley*,	Latin.
Paine, Claude James,	*Chicago*,	Eng. and Mod. Lang.
Peddicord, Jessie Mae,	*Champaign*,	Natural Science.
Perry, John Nevin.	*Malden*,	Electrical Engineering.
Peterson, Frank Oscar,	*Cable*,	Mechanical Eng'g.
Phillips, Theodore Clifford,	*Mt. Carroll*,	Electrical Eng'g.
Pixley, Arthur Homer,	*Ingraham*,	Eng. and Mod. Lang.
Powell, John Thomas,	*Bellflower*,	Natural Science.
Rapp, George Leslie,	*Carbondale*,	Electrical Eng'g.
Ray, Walter Thornton,	*Metamora*,	Electrical Eng'g.
Raymond, John Eaton,	*Sidney*,	Mechanical Eng'g.

Reed, John Caldwell,	*Philo*,	Electrical Engineering.
Rhodes, Edward Melville,	*Bloomington*,	Mechanical Eng'g.
Roysdon, Emmett Russell,	*Champaign*,	Natural Science.
Rupprecht, Edgar,	*Corell*,	Mechanical Eng'g.
Saylers, Harrison,	*Monticello*,	Eng. and Mod. Lang.
Schuyler, James Chauncey,	*Sycamore*,	Mechanical Eng'g.
Seass, Llewellyn Dexter,	*Urbana*,	Eng. and Mod Lang.
Shamel, Archibald Dixon,	*Taylorville*,	Agriculture.
Shirley, Harry,	*Gibson City*,	Eng. and Mod Lang.
Shuler, Hugh McWhurr,	*Gilchrist*,	Civil Engineering.
Sperry, James Franklin,	*Champaign*,	Eng. and Mod. Lang.
Spiker, John Golden,	*Flora*,	Natural Science.
Spring, Lillian,	*Cobden*,	Natural Science.
Stedman, Alfred Bennett,	*Champaign*,	Electrical Eng'g
Stoltz, Fritz W,	*Pekin*	Electrical Engineering.
Sommer, Harry,	*Chicago*,	Electrical Eng'g.
Tait, Benjamin Franklin,	*Macon*,	Eng. and Mod. Lang.
Taylor, Frederick Dan,	*New Berlin*,	Agriculture.
Thompson, Charles Oscar,	*Isabel*,	Pharmacy.
Thompson, McDonald,	*Isabel*,	Mechanical Eng'g.
Trevett, John Howard,	*Champaign*,	Natural Science.
Trevett, Ross Lennington,	*Champaign*,	Eng. and Mod. Lang.
Uthoff, Herman Conrad,	*Peru*,	Chemistry.
Vennum, Vinnie Vesta,	*Fisher*,	Eng. and Mod. Lang.
Waldo, Marie L,	*Champaign*,	Architecture.
Waldron, J Eldridge,	*Colorado City, Colo.*,	Architecture.
Watson, LuEtta Belle,	*Arcola*,	Eng. and Mod. Lang.
Weeks, Charles Henry,	*Upper Alton*,	Architecture.
Whelpley, Cecelia,	*Cobden*,	Natural Science.
White, Edna Noble,	*Fairmount*,	Chemistry.
White, Leila,	*Fairmount*,	Eng. and Mod. Lang.
Wilcox, Maurice Meacham,	*Elmore*,	Civil Eng'g.
Williamson, George Warren,	*Blandinsville*,	Classical.
Wilnot, Arthur Xenophon,	*La Prairie Center*,	Electrical Engineering.
Wilson, Frank DeWitt,	*Kewanee*,	Eng. and Mod. Lang.
Wolfarth, Carl Albert,	*Chicago*,	Electrical Eng'g.
Zilly, Fred McKinley,	*Champaign*,	Pharmacy.

SUMMER SCHOOL—1894.

Blake, Edmund J.,	*Watseka.*
Bowsher, Columbus Austin,	*Champaign.*
Brooks, Edwin Bruce,	*Atwood.*
Clark, Cyril Balfour,	*Champaign.*
Clendenin, Adelle,	*Urbana.*
Clinton, John DeWitt,	*Polo.*
Conaway, Hortense Grace,	*Urbana.*
Dietz, Charles Louis,	*Marine.*
Ermentrout, Anna Mae,	*Urbana.*
Ferguson, Eugene Ray,	*Lake Charles, La.*
Fisher, Virginia Belle,	*Ridge Farm.*
Gableman, Julius Gordon,	*Okaweville.*
Goble, Rebecca,	*Weldon.*
Graff, Mamie Elizabeth,	*Greenville.*
Heller, Opal Beatrice,	*Urbana.*
Hill, Lewis,	*Ottawa.*
Hughes, John Lewis,	*Newman.*
Knight, Robert Franklin,	*Wichita, Kansas.*
Lischer, Charles,	*Mascoutah.*
*McGregor, Leonard Allen,	*Earlville.*
McRae, John Alexander,	*Champaign.*
Martin, John Madison,	*Bement.*
Morris, Minnie,	*Urbana.*
Pfeffer, John Edward,	*Bondville.*
Richardson, Francis M,	*Chenoa.*
Richardson, Mrs. Stella Wilson,	*Chenoa.*
Ross, Luther Sherman,	*Des Moines, Ia.*
Russell, Charles Wesley,	*Champaign.*
Short, Robert Lewis,	*Fort Worth, Texas.*
Snyder, Mary Jane,	*Champaign.*
Steele, Ella,	*Sullivan.*
Sunderland, Frances,	*Delavan.*
Todd, Grace,	*Arcola.*
VanOrstrand, Charles Edwin,	*Pekin.*
Vickery, Charles Roy,	*Dwight.*
Wildhaber, Addie Lina,	*Highland.*
Willson, Howard T.,	*Urbana.*
Wilson, Francis DeWitt,	*Loda.*

*Deceased.

WINTER SCHOOL IN AGRICULTURE—1895.

Barrington, Albert Charles Augustus,	*Ringwood.*
Bake, Amos Russell,	*Bradford.*
Brennemann, Ernest.	*Peru.*
Carr, George William.	*Yellow Springs, O.*
Castle, Sydney Oswald,	*Chicago.*
Craig, Robert Hanson,	*Charleston.*
Cullinan, Maurice Frank.	*Dillon.*
Curtis, William,	*Delavan.*
Edwards, Albert Henry,	*Tolono.*
Hall, Fred Fay,	*Champaign.*
Hall, Robert William.	*Champaign.*
Hester, Amos Cook,	*Indianola.*
Hollensbe, Alva Orion,	*Champaign.*
Howell, Carrie Barnes,	*Champaign.*
Jackson, William E.,	*Champaign.*
Keeley, Meade Daniel,	*Spankey.*
Keir, David,	*Joliet.*
Klein, Joseph,	*Champaign.*
Luehm, Albert John.	*Highland.*
Metz, Clarence,	*Chambersburg.*
Miner, Harvey Russell.	*Adair.*
Mitchell, Oscar Alonzo.	*Bethany.*
Moore, Walter Ellsworth.	*Pesotum.*
Paul, Joseph Wesley,	*Brookville.*
Peak, William Jasper,	*Winchester.*
Phillis, Alma Wilbur,	*Freeport.*
Pratt, George Wallace.	*Staley.*
Smetters, McCormick,	*Waverly.*
Smith, Wilson Prentice,	*Cary Station.*
Walker, John Hardcastle.	*Greenfield.*
Taylor, Frederick Dan,	*New Berlin.*
Walsh, William,	*Ivesdale.*
Ware, Frank Wilbur.	*Mahomet.*
Wederman, John Hy,	*Gibson City.*
Zimmerman, Irvine Frederick.	*Earlville.*

SUMMARY.

Courses and Classes.	University.									Preparatory School.		University and Preparatory School.	
	Graduate School	Resident Graduates.	Seniors	Juniors	Sophomores	Freshmen	Specials	Men and Women	Total	Men and Women	Total	Total Men and Women	Total
Agriculture, Men	..	..	..	..	3	4	2	9	9	7	7	16	16
Mechanical Eng'g, Men.	4	..	10	11	15	26	..	66	66	20	20	86	86
Electrical Eng'g, Men..	..	..	9	23	19	38	2	91	91	17	17	108	108
Civil Engineering, Men.	2	2	16	14	13	24	2	73	73	9	9	82	82
Municipal and Sanitary Eng'g, Men	..	..	2	..	..	..	..	2	2	..	..	2	2
Architecture { Men	2	1	14	16	18	17	3	71	73	11	11	82	85
Architecture { Women	..	..	..	..	1	..	1	2		1	....	3	
Architectural Eng., Men	..	..	4	2	2	6	1	15	15	4	4	19	19
Chemistry { Men	..	1	5	7	11	11	2	37	40	2	3	39	43
Chemistry { Women	..	..	..	2	..	1	..	3		1		4	
Pharmacy, Men	..	..	..	..	2	3	1	6	6	5	5	11	11
Natural Science { Men	3	..	4	2	14	12	1	36	49	11	20	47	69
Natural Science { Women	1	1	5	..	3	2	1	13		9		22	
Mathematics { Men	..	..	..	1	1	1	..	3	4	1	1	4	5
Mathematics { Women	..	..	..	..	..	1	..	1		.....	.....	1	
English and Modern Languages { Men	5	..	11	9	7	26	5	63	104	19	31	82	135
English and Modern Languages { Women	3	..	2	6	9	9	12	41		12		53	
Latin { Men	..	..	1	1	3	6	..	11	26	3	6	14	32
Latin { Women	1	..	3	3	3	4	1	15		3		18	
Classical { Men	1	1	4	1	7	8	3	25	29	7	11	32	40
Classical { Women	..	..	2	..	..	2	..	4		4		8	
Art and Design { Men	..	..	..	..	..	1	2	3	13	....	.....	3	14
Art and Design { Women	..	2	..	..	2	..	6	10		1	1	11	
Music, Women	..	..	..	..	..	..	2	2	2	.....	.....	2	2
Physical Cult're, Women	..	1	..	..	..	..	1	2	2	.....	.....	2	2
Total { Men	17	5	80	87	115	183	24	511		116		627	
Total { Women	5	4	12	11	18	19	24	93		31		124	
Total	22	9	92	98	133	202	48		604		147		751

Add for Summer School, 1894, those not counted above, { Men.....18 / Women.....12 } 30

Add for Winter School in Agriculture, 1895, those not counted above { Men.....28 / Women. 1 } 29

Total, 1894-5. { Men.....673 / Women.....137 } 810

HOLDERS OF SCHOLARSHIPS, PRIZES, AND COMMISSIONS.

Honorary Scholarships.

Adams,	Steinwedell, George Otto.
Carroll,	Carpenter, Hubert Vinton.
Champaign,	Marble, Harry Curtis.
Clay,	Campbell, George Henry.
Clinton,	Webster, Sarah E.
Coles,	Millar, Adam Vause.
Cook,	Bailey, Leonard Lionel.
Douglas,	Carmack, Clyde Robert.
Du Page,	von Oven, Frederick W.
Hancock,	Ketchum, Richard B.
Iroquois,	Dillon, William W.
Jackson,	Allen, Lewis Richard.
Jefferson,	Webber, Hubert Anthony.
Kane,	Shepardson, John E.
La Salle,	Sparks, Marion E.
Lee,	Mellen, Ernest R.
Livingston,	Holtzman, Stephen F.
Marion,	Row, George S.
Marshall,	Ponzer, Ernest W.
Menard,	Newcomer, Joseph H.
Rock Island,	Schacht, Frederick W.
Sangamon,	Porter, Robert K.
Tazewell,	Van Orstrand, Charles E.
Whiteside,	Reeves, Harley E.
Will,	Barr, George A.
Woodford,	Borroughs, Edward.

Accredited School Scholarships.

Camp Point High School,	Nevins, John.
Elgin High School,	Hobart, Albert Claude.
Galena High School,	Pooley, William V.
Paxton High School,	Clark, Winfred N.
Urbana High School,	Staley, Joseph C.
Warsaw High School,	Worthen, George R.

Chicago Club Loan Fund.

Shless, Charles L.

Winner of the Hazelton Prize Medal. 1894.

Cadet Corporal John Langley Sammis.

Roster of Officers and Non-Commissioned Officers of the University of Illinois, 1894–95.

Major, H. E. Reeves.
Adjutant, Captain H. R. Marsh.
Sergeant-Major, H. C. Porter.
Color Sergeant, F. E. King.
Color Guard, W. A. Brubaker and J. A. Dewey.
Band Leader, A. R. Mann.
Drum Major, H. F. Merker.

Co. A—Captain, C. W. Noble; 1st Lieutenant, C. A. Risor; 1st Sergeant, L. I. Brower; Sergeants, J. H. Young, W. M. Vigal, O. T. Wills; Corporals, M. I. Hopkins, W. L. Fergus, D. R. Enochs, A. H. Holcomb, T. B. Garrett, A. H. Neureuther.

Co. B—Captain, J. A. Green; 1st Lieutenants, R. K. Porter, R. P. Manard; 1st Sergeant, J. L. Sammis; Sergeants, C. W. Young, A. J. Williamson, J. E. Trogdon; Corporals, F. W. von Oven, O. M. Rhodes, A. R. Crathorne, W. R. Fetzer, A. C. Beal, F. W. Spencer.

Co. C—Captain, W. N. Vance; 1st Lieutenants, J. H. McKee, J. E. Row; 1st Sergeant, C. W. Leigh; Sergeants, C. D. Gulick, M. Peterson, H. Graham, A. V. Millar; Corporals, R. W. Weirick, H. L. Wuerffel, A. D. DuBois, W. D. Houghton, J. Nevins, S. E. Hall.

Co. D—Captain, J. E. Shepardson; 1st Lieutenants, G. H. Scott, R. P. Brower; 1st Sergeant, F. C. Beem; Sergeants, M. Hay, C. O. Kuehne, C. Howison; Corporals, A. H. Hughes, D. Hall, C. A. Clark, F. Ritchey, T. W. Clayton, S. L. Soper.

Artillery Detachment—1st Lieutenant, F. H. Green; 1st Sergeant, G. F. Anderson; Sergeant, A. C. Hobart; Corporals, L. R. Allen, H. M. May.

LIST OF GRADUATES.

[A second address in parenthesis is a business address. Doubtful addresses are enclosed in brackets.]

Class of 1872.

Burwash, Milo Benedict, M.S., Farmer. Savoy.

Davis, John Jefferson, B.S., Physician, 1119 College Ave., Racine, Wis. (504 Monument Square.)

Drewry, Henry A., Physician, Altamont.

Flagg, Alfred Murray, Capt. [Editor W. Superior, Wis.]

Hatch, Miles Fayette, M.S., Farmer and Mill Owner, Burton, Wash.

Lyman, George H., Real Estate Agent, 316 6th St., Ft. Smith, Ark. (519 Garrison Ave.)

Matthews, James Newton, M.L., Physician, Mason.

Parker, Calvin Ebenezer, Banker, Philo.

Reiss, Willis Albert, M.S., Surveyor and Civil Engineer, Belleville.

Reynolds, Stephen Avery, Capt., Lawyer, 1863 Humboldt Bvd., Chicago. (838 Chicago Stock Exchange.)

Rickard, Thomas Edwin, M.L., Farmer and Stock Raiser, Springfield.

Ricker, Nathan Clifford, M. Arch., Dean College of Engineering, Professor of Architecture, Univ. of Ill., 612 W. Green St., Urbana.

Rolfe, Charles Wesley, M.S., Professor of Geology, Univ. of Ill., 201 W. Green St., Urbana.

Silver, Charles Wallace, M.L., Mfgr Silver Bouillon Tablets, Oak and North State Sts., Chicago. (292 N. State St.)

Silver, Howard, M.L., Insurance, 13th and Jackson Sts., St. Paul, Minn. (Eau Claire, Wis.)

*Teeple, Jared, died at Marengo, April 2, 1888.

Wharton, Jacob Norton. [Builder, Chicago.]

Whitcomb, Alonzo Lyons, M.L., Physician, 952 E. 7th St., St. Paul, Minn. (971 E. 7th St.)

Wood, Reuben O., Capt.

Class of 1873.

Graham, Charles Peyton, M.L., Clergyman, New Salem, Kansas.

Hatch, Frederic L., M.S., Farmer, Spring Grove.

Hays, Charles I., M.S., Instructor in Science in North Denver High School, 431 Gray St., Denver Colo.

Hennesy, Augustus L. [Brookline Park, Chicago.]

Hill, Edgar L., Capt., Trinidad, Colo.

Hook, Samuel Houston.

Morrow, Andrew T., C.E., Civil Engineer with Mississippi River Commissioner, Rockford. (2732 Pine St., St. Louis, Mo.)

Ockerson, John Augustus, C.E., Chief Assistant Engineer with Mississippi River Commission, 4217 Washington Ave., St. Louis, Mo. (2732 Pine St.)

Phillips, Parley Agrippa, M.L. [Farmer, Madison Station, Miss.]

Platt, Franklin Carpenter, M.L., Capt., Lawyer and Banker, 420 E. 4th St., Waterloo, Iowa. (Fourth and Sycamore Sts.)

Porterfield, Elijah Neulan, C.E., Loans and Investments, 211 W. 26th St., Kearney, Neb.

Robbins, Henry Edwin, M.S., Superintendent of Schools, 615 Broadway, Pueblo, Colo.

Swartz, Alexander C., C.E., Civil Engineer and Architect, Fresno, Cal. (Fiske Bldg.)

Williams, Louis Edward, M.S., B.L., Lawyer, Real Estate and Loans, 119 N. 5th St., Keokuk, Iowa.

Class of 1874.

Baker, Ira Osborn, C.E., Professor Civil Engineering, Univ. of Ill., 607 W. University Ave., Champaign.

Campbell, John P., M.L., Physician, Winchester.

Drury, Ebenezer L., County Judge, Chamberlain, S. Dak.

Eaton, Herbert, Printer, 1102 W. Jackson St., Bloomington.

Ells, William C., C.E., Civil Engineer, 606 S. Neil St., Champaign. (Hotel Washington, Kansas City, Mo.)

Estep, Harvey C., C.E., Civil Engineer, 626 Bradley St., Seattle, Wash.

Foster, Charles William, Director of Music, Univ. of Ill., 39 Neil St., Champaign.

Gabrialial, Gregory, Farmer, Backjajeck, Turkey.

Gennadius, Panagiottis, B.S., Farm Proprietor, Athens, Greece.

Jeffers, Charles Perry, M.S., Pharmacist, Swampscott, Mass.

Pickrell, William, Electric Lighting, Phœnix, Arizona.

Pierce, John L., A.B., Lawyer and Investment Broker, 821 S. 34th St., Omaha, Neb. (834 New York Life Bldg.)

Reynolds, Henry S., M.S.

Smith, Charles, A., B.S.

Storey, George, C.E.

Watts, William.

Wharry, Walter Ward, Insurance, 279 Lincoln Ave., Chicago.

Cheever, Alice, M.L., Mrs. A. H. Bryan, 410 W. Univ. Ave., Champaign.

Potter, Frances Adelia, B.L., Mrs. H. S. Reynolds.

Class of 1875.

Barnard, D. Elroy, Mechanical Engineer, 741 West Church St., Beloit, Wis.

Barnes, Arthur E., B.S., V. Pres. and Gen. Mgr. Penn. Enameled Brick Co., 902 De Kalb St., Norristown, Pa. (Oaks, Pa.)

Brown, Dillon Sidney, M.S., Banker, Genoa.

Brown, Ralph Lee, M.L., Abstracter of Titles, Ashland, Ky.

Coddington, Vantile William, Architect, 2252 Ridge Ave., Evanston. (64 Portland Block, Chicago.)

Dobson, Franklin P., Capt., Real Estate Broker, 241 E. 66th St., Chicago. (46 E. 31st Street.)

Dunlap, Burleigh Arthur, Lawyer, 206 7th Ave., Maywood. (85–163 Randolph St., Chicago.)

Dunlap, Henry M., M.S., Farmer and Fruit Grower, Savoy.

Eaton, Ernest, Farmer, Downs, Okla. Ty.

Everhart, Winfield Scott, M.L., Lawyer, Toledo.

*Faulkner, James, Capt., died at Bloomfield, October 1, 1892.

Gridley, George N., 2813 S. Park Ave., Chicago.

Kenower, George Frederic, M.L., Editor *Wisner Chronicle*, Wisner, Neb.

Leflar, John Emerson.

Lyford, Charles C., B.S., Veterinarian, 831 Third Ave. S., Minneapolis, Minn.

McCauley, John Charles, Teacher, Defiance Coll., Defiance, O.

Mueller, John, B.S., Physician, 362 Wells St., Chicago.

Parks, James H., Justice of Peace, Enid, Okla. Ty.

Parsons, Fernando Alston, M.L., Cashier Farmers' and Drovers' Bank, Kingman, Kan.

Patch, Emory Edward, Supt. New Doty Mfg. Co., 255 Glen St., Janesville, Wis.

Pickrell, Watson, M.S., Farmer, Tempe, Ari. Ty.

Pollock, William Clarence, Chief of Division Indian Affairs, 1317 11th St. N.W., Washington, D.C. (Interior Department.)

Robinson, Elna Alphonso, M.E., Proprietor Machine Shops, 112 West Hill St., Champaign. (Neil and Hickory Sts.)

Scovell, Melville Amasa, M.S., Director and Chemist of Ky. Agtl. Expt. Station and State Chemist, Lexington, Ky.

Scudder, Clarence Orlando, Evanston. (Principal Emerson School, Chicago.)

Shawhan, George Robert, B.L., County Superintendent of Schools, 807 S. Wright St., Champaign. (Urbana.)

Tyndale, Hector Hilgard, Lawyer, 80 Washington Square, New York City. (45 Wall St.)

Warner, Lyman Fenn, Civil and Hydraulic Engineer, Auburn, Cal. (Ass't. Supt. Cariboo and Horse Fly Hydraulic Mines, Vancouver, British Columbia.)

Anderson, Laura Morris, Mrs. J. R. Greenhalgh, Champaign.

Campbell, Amanda, M.L., Mrs. Milton Moore, Mansfield.

Hullinger, Kate, Mrs. Sterling. [Parker, S. Dak.]

Kariher, Israella Kate, Mrs. Albert Eisner, Champaign.

Kellogg, Flora Lorena, Mrs. Hudson. [Coldwater, Ia.]

Lee, Alice, B.L., Mrs. V. W. Coddington, 2252 Ridge Ave., Evanston.

Pierce, Fanny, 821 S. 34th St., Omaha, Neb.

Steele, Mary Carter, B.L., Mrs. N. C. Ricker, 612 W. Green St., Urbana.

Stewart, Maggie Esther, M.L., Mrs. H. E. Robbins, 615 Broadway, Pueblo, Colo.

Class of 1876.

Allen, Ralph, M.S., Farmer, Delavan.

Ballou, Edward Lull, Mine and Mill Owner, Igo, Cal.

*Campbell, James William, died at Los Gatos, Cal., Jan. 22, 1890.

Chandler, William B., Lawyer, Bourbon, Ill.

Clark, Charles W., C.E., Architect and United States Assistant Engineer, American Central Bldg., St. Louis, Mo.

Drake, James Frederic, Lawyer, Pueblo, Colo.

Gill, John D. [Lawyer, Duluth, Minn.]

Gore, Simeon T. [Architect, Chicago.]

Gregory, Charles E., Capt., Attorney, Minot, N. Dak.

Knibloe, Walter E., M.E., Supt. City Schools and Principal High School, St. Augustine, Fla.

Mackay, Daniel S., Farmer, Mt. Carroll.

Mackay, Henry, M.L., Lawyer, Mt. Carroll.

Mackay, William A., Capt., Cashier Banking House Daly & Mackay, Madison, S. Dak.

Mahan, Henry Weston, M.L., Cashier Oakland National Bank, 5532 Monroe Ave., Chicago. (3955 Cottage Grove Ave.)

Mann, Frank I., Capt., Circuit Clerk and Recorder, Watseka.

*Mann, Howard, died at Winnebago, Cal., April 23, 1876.

Mann, James R., M.L., Capt., Lawyer, 334 Oakwood Bvd., Chicago. (175 Dearborn St.)

Noble, Louis Reeder, B.S., Capt., Gen. Insurance Agent, 119 Western Ave., Mattoon. (4 East First St.)

Oliver, William F., Capt., Physician, Buenna, Wash.

Palmer, Frank M., Capt. [Lawyer, Clinton.]

Pierce, Elon A., Printer, Belmond, Ia.

Rhodes, James Frederic, Farmer, El Dorado Springs, Mo.

Scribner, Artemas, died at Fairplay, Colo., April 24, 1891.

Starr, Frank A. E., M.L., Capt., Lawyer, Portland, Ore.

Weston, Charles, Merchant and Banker, Hay Springs, Neb.

*Wild, George A., died at Las Animas, Colo., November, 1880.

Williams, Thomas Thatcher. [Farmer, Sterling.]

Holton, Mattie Gray, Mrs. J. H. Krebbs, 3032 South Park Ave., Chicago.

Class of 1877.

Abbott, Theodore S., B.S., Civil Engineer, Saltillo, Coahuila, Mexico.

*Allen, Charles W., B.L., died at Harristown, July 8, 1880.

Barry, Charles H., Capt. Mgr. Western Dept. Penn. Fire Insurance Co. (208 Temple Bldg., Chicago.)

Barry, Frank, B.L., Capt., Publisher and Manufacturer, Milwaukee, Wis. (68 Mitchell Bldg.)

Blackall, C. H., M.Arch., Capt., Architect, Cambridge, Mass. (Music Hall Bldg., Boston.)

Brush, Charles, Architect, 518 W. Monroe St., Chicago. (702 Goff Bldg.)

Buckingham, William. [Care Siemans & Halske Electric Co., W. 48th St., Chicago.]

Bumstead, James E., M.S., Physician, Dundee.

Clay, Luther G., Horticulturist, Cobden.

Crow, Benjamin F., 4293 Cook Ave., St. Louis, Mo.

Elliott, Charles Gleason, Civil Engineer, Normal.

Faulkner, Richard Douglas, Principal Potrero Grammar School, 45 Sanchez St., San Francisco, Cal.

Gibson, Charles B., Capt., M.D., Consulting Chemist and Professor of Chemistry and Metallurgy, Chicago Coll. of Dental Surgery, 113 Hoyne Ave. (81 Clark St.)

Gilkerson, Hiram, Capt., Farmer, Hampshire.

Gilkerson, John, 958 W. Madison St., Chicago.

Kennedy, Allen Gilmore, Capt., Secy. and Treasr. of Donald, Kennedy & Son, Hampshire Arms, Minneapolis, Minn. (173 Western Ave.)

Lewis, Edward Vernon, Capt., Wholesale Pump and Steam Supplies, Omaha, Neb. (1014-16 Douglas St.)

Llewellyn, Joseph Corson, Architect, LaGrange. (66 Dexter Bldg., Chicago.)

*McPherson, John, died at Lexington, Ky., January 26, 1886.

Moore, John Fremont, Draughtsman with F. Heer & Son, Dubuque, Ia.

Rice, George Clark, General Merchandise, Oakwood.

Seymour, John James, President Fresno Water Co., 1136 N. St., Fresno, Cal. (1005 J St.)

Sim, Coler L., Capt., Banker, 1065 Emporia Ave., Wichita, Kas. (101 Main St.)

Spence, Franklin, Raiser and Trainer of Standard Bred Horses, Hamilton.

Stayman, John M., Ass't to Gen. Manager, Fraser and Chalmer, 93 Flournoy St., Chicago. (Cor. Fulton and Union Sts.)

Stoddard, Ira Joy, Jr., Title Examiner and Civil Engineer, Rahway, N. J.

Ward, Walter P., B.L., Lawyer, Spencer, Iowa.

Whitham, R. F., B.L., Capt., Civil Engineer, Olympia, Wash. (Room B, Chambers Block.)

Wright, Myron Jerome, Supt. Uric Dredge Mfg. Co., Osceola, Mo. (Kansas City, Mo.)

Adams, Nettie, Mrs. W. Bent Wilson, Lafayette, Ind.

Bogardus, Eva, Mrs. T. L. Price, Port Jefferson, N. Y.

Broshar, Cornelia, Artist, 406 S. Prairie St., Champaign.

Falls, Ida Belle, Urbana.

Gregory, Helen Barber, A.B., Artist, 19 Scott St., Chicago. (Studio Bldg., N. State St.)

Maxwell, Emily C., 2932 French St., Philadelphia, Pa.

Page, Martha, Mrs. M. E. Whitham, Olympia, Wash.

Piatt, Emma Clarinda, Mrs. J. C. Llewellyn, LaGrange.

Skinner, Velma Elethea, Mrs. Velma Skinner Ward, Spencer, Iowa.

Smith, Avis E., M.S., Physician, 309 Journal Bldg., Kansas City, Mo.

Switzer, Gertrude, Mrs. H. Peddicord, 813 W. Church St., Champaign.

*Victor, Carrie D., Mrs. Ira J. Stoddard, died in Chicago April 19, 1894.

Class of 1878.

Baker, Edward J., B.S., Farmer, Savoy.

*Ballard, Charles K., B.S., died March 3, 1895, at Oak Park.

Bridge, Wallace Everett, B.S., Capt., Merchant, 415 W. 26th St., Minneapolis, Minn. (2604 Lyndale Ave., S.)

Brown, Frank A., Law and Real Estate, Aberdeen, S.D.

Bullard, Samuel A., B. S., Architect, 318 Doyle Ave., Springfield. (208 S. Sixth St.)

Burr, Ellis M., B.S., Proprietor of Foundry and Machine Shop, 306 Washington St., Champaign. (Neil and Hickory Sts.)

Coffin, Frank Sherman. [Lawyer, Nashville, Tenn.]

Coffman, Noah Beery, B.S., President First National Bank, Chehalis, Wash.

Dean, Frank A., Capt., Merchant, Holdredge, Neb.

Francis, Frederick, Neponset.

Gaffner, Theophilus, Physician, Trenton.

Gregory, Alfred, A.B., Capt., Lawyer, Kansas City, Mo. (Beals Building.)

Hauser, Henry. [Civil Engineer, Chicago.]

Lee, Eddy Orland, B.L., Lawyer, Booth, Lee & Gray, Salt Lake City, Utah. (62-65 Commercial Block.)

Lloyde, Frank Hayden, Music and Books, Champaign. (D. H. Lloyde & Son.)

McLane, James A., B.S., Real Estate, 3005 Vernon Ave., Chicago. (Care Mead & Co., 100 Washington St.)

Moore, Aaron Henry, Retail Lumber, Louisville. (Wabash Lumber Yards.)

Morava, Wensel, B.S., Capt., Consulting Engineer, and Contractor, 3621 Monroe Ave., Chicago. (65–84 Adams St.)

Patchin, John Wakeley, Lawyer, Traverse City, Mich.

Pollock, James Lyon, B.L., Lawyer and Real Estate Agt., Mt. Vernon.

Richards, Charles L., B.S., Lawyer, Hebron, Neb.

Rudy, William Dole, B. S., Real Estate, The Portland, Washington, D.C. (1324 F St., N.W.)

*Rutan, Abram R., died at Raton, New Mexico, June 4, 1887.

Savage, Manford, B.L., Lawyer, 307 W. Washington st., Champaign. (16 Main st.)

Sawyer, Hamlin Whitmore, Capt., Pub. *Oklahoma Herald*, El Reno, Okla. Ty.

Sparks, Hosea B., Capt., Miller, Alton.

*Spradling, William F., died at Greenleaf, November 30, 1881.

Sprague, Martin, Claim Agent I. & G. N. R. R. Palestine, Texas.

Weed, Mahlon O., B.S., Farmer, Alvo, Neb.

Whitlock, John Franklin, B. S., Capt. [Forest City, S. Dak.]

Ziesing, August, B.S., Capt., Engineer and Mgr. Lassig Bridge and Iron works, 2569 Ashland Ave., Ravenswood. (Clybourn and Wrightwood Ave., Chicago.)

Zimmerman, Henry W., B.L. [Chemist LaSalle.]

Columbia, Emma, Mrs. J. R. Mann, 334 Oakwood Bvd., Chicago.

Culver, Nettie M., B.L., Mrs. O. Ellison.

Davis, Nancy Jane, Mrs. M. A. Scovell, Lexington, Ky.

Deardorff, Sarah C., B.S., Mrs. B. F. Donnel, Teacher, Ashland, Kas.

*Estep, Ida May, died at Rantoul, January 25, 1887.

Estep, Jessie, 626 Bradley St., Seattle, Washington.

Larned, Mary S., Mrs. M. L. Parsons, Kingman, Kas.

Mahan, Jennie C., Mrs. P.W. Plank, 1421 H St., Lincoln, Neb.

Page, Emma Elizabeth, B.L., with W. C. T. U., Olympia, Washington.

Page, Mary L., Abstracter and Draughtsman, Olympia, Wash.

Class of 1879.

Beardsley, Henry Mahan, M.L., Lawyer, Beardsley, Gregory & Flannelly, Kansas City, Mo. (Beals Bldg.)

Bourne, Henry Peter. [Hendley, Neb.]

Butler, William M., Lawyer, State's Attorney, Cairo. (612 Commercial Ave.)

*Coburn, R. B.S., Capt., died at San Antonio, Texas, January 10, 1894.

Freijs, Charles Theodore, Capt., Architect, Englewood. (324 Dearborn St., Chicago.)

Gunder, James, B.S., Grain Merchant, Fairmount.

Hoit, Otis W., Farmer and Stock Raiser, Geneseo.

Johnson, William Pitt, Capt. [Chicago.]

Kays, Emery, Farmer, Phoenix, Arizona.

Kimble, Willis P., B.S., Division Engineer N. Y., L. E. & W. R. R., Cleveland, Ohio. (Central Passenger Station.)

Kuhn, Isaac, B.S., Merchant, San Diego, Cal.

Lee, Elisha, B.S., Farmer, Hamlet.

*Milton, Franklin Silas, B.S., died at Platteville, Colo., July 22, 1892.

Stanton, Samuel C., B.S., Capt., Physician and Surgeon, Park Ridge. (1404 Monadnock Blk., Chicago.)

Swannell, Arthur, Capt., Dry Goods Merchant, Kankakee.

Taft, Lorado, M.L., Sculptor, 26 E. Van Buren St., Chicago.

Thompson, William A., B.S., Capt., Broker, Riverside. (Chicago Stock Exchange Bldg.)

Walker, Francis E., Capt., Gardener, Roseland, La.

Whitmire, Clarence L., Physician and Surgeon, Waverly, Iowa. (First National Bank Bldg.)

Butts, Augusta E., B.S., Principal Boulevard School, 16 Pratt Place, Chicago.

Hale, Isabella, B.S.

Kimberlin, Nettie D., Supervisor Physical Culture, Detroit Public Schools, 78 Elizabeth St., W. Detroit, Mich.

McAllister, Minnette C., B.L., Mrs. H. J. Miller. [Minneapolis, Minn.]

Class of 1880.

Bley, John C., B.S., Mechanical Expert, 913 Jackson Bvd., Chicago. (Owings Bldg.)

Briles, Bayard Sterns, B. S.

Conklin, Roland R., M.L., Vice Pres. N. A. Trust Co., 238 W. 73d St., New York City. (40 Wall St.)

Cook, Charles F., B.S.

Groves, Charles Wesley, Supt. Schools, Harvard.

Hafner, Christian F. [Oak Park.]

Hardin, Edgar E., Pres. First National Bank, Liberty, Neb.

Hatch, Frank W., A.B. [Farmer, English Prairie.]

Hyde, Benjamin, Engineer and Contractor, 234 Hampden Court, Chicago. (Rookery Bldg.)

Jones, Robert D., Cashier Bradford Exchange Bank, Bradford.

Kingsbury, Charles, B. L. [Highlands, Colo.]

Neeley, Charles G., Lawyer, Evanston. (612 Title and Trust Bldg., 100 Washington St., Chicago.)

Parker, Washington L., B.S., Engineer, 6504 State St., Chicago. (64th and State Sts.)

Robinson, Albert F., C.E., Civil Engineer, 910 Monroe St., Topeka, Kas.

Robinson, Arthur S., Engineer Bloomington Road, North Decatur. (125 N. Water St.)

Savage, George M., M.L., Lawyer, Cor. Pine St. and Tullis Ave., Olympia, Wash.

Sondericker, Jerome, C.E. Asst. Professor Applied Mechanics, Mass. Inst. Tech., Oakleigh Road, Newton, Mass. (Boylston St., Boston.)

*Travis, William W., died September 30, 1885.

White, Frank, B.S., Valley City, N. D.

Bacon, Katherine, L., B.L., New Whatcom, Wash.

Bachelder, Augusta, Mrs. W. T. Eaton, Texarcana, Ark.

Lucas, Corda, Teacher, 108 5th St., Champaign.

Parker, Minnie A., B.L., Mrs. V. N. Hostetler, 341 Macon St., Decatur.

*Pearman, Ida, B. L., Mrs. C. H. Stevens, died at Logansport, Ind., August, 1892.

Watson, Ella M., Mrs. J. H. Davis, Straight Creek, Kas.

Class of 1881.

*Allison, James G., died at Anthony, Kansas, April 21, 1891.

Armstrong, James E., B.S., Principal Englewood High School, 529 W. 62d St., Chicago.

Beach, Bayard E., B.L., Cashier with Burnham, Trevett & Mattis, 529 Beach St., Huron, S. D.

Bellamy, Albert, Real Estate and Loans, Girard.

Birney, Frank L., Physician, 1010 17th St., Denver, Colo.

Boothby, Arthur, B.S., Designer and Draughtsman, 1713 N. Penn. St., Indianapolis, Ind. (Dean Bros. Steam Pump Works.)

Boyd, Comma N., Farmer, Sheffield.

Coddington, Archibald O., M.L., Principal Knickerbocker School, 529 Burling St., Chicago.

Cooper, Frederic E, B.S., Loan Broker, Van Buren, Ark.

Davis, Arthur E., B.L., Railway Station Agt., Sulphur Springs, Texas.

Dennis Charles H., B.L., Managing Editor *Daily Record*, 334 Hampden Court, Chicago.

Dresser, John C., B.S., Salesman, Sorento.

Forsyth, James W., Machinist, Gilroy, Cal.

Hammett, Frank W., Capt., B.S., Clerk First National Bank, Tuscola.

Hill, Fred L., Civil and Architectural Engineer, 3441 Rhodes Ave. (23d St., and Stewart Ave., Chicago.)

Hill, Thomas C., A.B., Capt., Prin. Geo. W. Curtis School, 11527 Michigan Ave., Chicago. (Stanwood Ave. and State St.)

*Kingman, Arthur H, died at Boston, Mass., in 1892.

McKay, Francis Marion, B.L., Principal Anderson School, 134 Warren Ave., Chicago. (Lincoln and Division Sts.)

Mansfield, Willis A., B.L., Physician, Washington.

Mason, William K., B.S., Farmer, Buda.

Morse, John H., Capt., President Home Embroidery Machine Co., Kansas City, Kas. (Room F Husted Bldg.)

Pearman, James Ora, B.S., Physician, Champaign.

Pepoon, Herman S., Teacher of Biology Lake View High School, Chicago, 2443 Commercial St., Ravenswood.

Pepoon, William A., Farmer and Gardener, Jonesboro, Ark.

Philbrick, Ethan, B.S., Capt., Civil Engineer, Western Springs.

*Pletcher, Francis M., B.S.

*Porter, Frank H., Capt., died in 1885.

Ross, Sprague D., B.S., with First National Bank, Grand Island, Neb.

Schwartz, Joseph, Druggist and Fruit Grower, Salem.

Seymour, Arthur B., B.S., Ass't. in Cryptogamic Herbarium, Harvard University, Waverly, Mass.

Slade, Byron A., B.S., Capt., Druggist, 422 E. State St., Rockford.

Stacy, Morelle M., B.S., Spring Hill, Ala.

Sturman, James B., B.L., Lawyer, 738 64th St., Englewood. (193 Adams St., Chicago.)

Talbot, Arthur N., C.E., Capt., Prof. of Municipal and Sanitary Engineering, Univ. of Ill., 617 University Ave., Champaign.

Weston, William S., B.L., B.S., Civil Engineer, 1519 Adams St., Chicago.

Wilson, Maxwell B., Farmer, Paris.

Baker, Kittie M., Mrs. J. G. Wadsworth, 110 Bancroft St., Council Bluffs, Ia.

Barnes, Bertha E., B.L., Mrs. S. D. Ross, Grand Island, Neb.

Davis, Marietta, B.L., Mrs. H. M. Beardsley, 3612 Walnut St., Kansas City, Mo.

Elder, Loretta Kate, B.L., Mrs. A. F. Robinson, 910 Monroe St., Topeka, Kas.

Hammet, Virginia Mann, Mrs. A. N. Talbot, 617 University Ave., Champaign.

*Lawhead, Lucy M., died at Champaign, May 1, 1884.

Lawrence, Nettie E., Mrs. J. A. Allen, Tulare, Cal.

Macknet, Meta M. Irene, A.B., Mrs. M. M. Beach, 529 Beach St., Huron, S.D.

Thomas, Darlie, B.L., Bookkeeper, 5202 Washington Ave., Chicago. (230 Franklin St.)

Wright, Jessie A., B.L., Mrs. H. E. Richardson, Mascoutah.

Class of 1882.

Bailey, Samuel G., Jr., B.S., Capt., Real Estate and Loans, Topeka, Kas.

Barnes, Charles C., Supt. Penn. Enameled Brick Co., Oaks, Penn.

*Bridge, Arthur M., died at Goldfield, Ia., June 9, 1894.

Bullard, Benjamin Franklin, B.L., Teacher, Chehalis, Wash.

Bullard, George Wesley, B.S., Architect, Tacoma, Wash. (Chamber of Commerce Bldg.)

Carman, William Burgess, B.S., Capt., Physician, 302 University Ave., Rochester, N. Y.

Cole, Edward E., Capt., Teacher of Science, Pueblo, Colo.

Curtiss, William G., Farmer, Stockton, Ill. (Nora.)

Davis, Jeptha H., Farmer, Straight Creek, Kas.

Eichberg, David, B.L., Capt., Lawyer, 543 LaSalle Ave., Chicago. (167 Dearborn St.)

Eisenmeyer, Andrew J., B.S., Capt., Pres. Eisenmeyer Milling Co., Springfield Mo.

Harrison, Samuel A., A.M., Principal Burroughs School, 3022 S. Park Ave. (Washtenaw Ave. and Geneva St., Chicago.)

Merritt, Charles H., with Farmers' State Bank, Mason City.

Neely, John R., B.L., Physician, 215 First St. S. E., Washington, D. C.

Noble, Thomas, Mining Engineer, San Diego, Cal.

Orr, Robert E., B.S., Capt., Clerk for Commissioner of Public works, 618 Church St., Evanston.

*Palmer, Charles W., B.L., died at Austin, Tex., July 4, 1884.

Peabody, Arthur, B.S., Architect, 6521 Greenwood, Ave., Chicago.

*Richards, George William, B.S., Capt., died at Carthage, N.M., May 15, 1889.

Roberts, Charles N., B.S., Engineer and Surveyor, 4078 Milwaukee Ave., Chicago. (Room 314. 87 Washington St.)

Rugg, Frederick D., B.L., Boot and Shoe Merchant, 609 University Ave., Champaign, (Head of Main St.)

Sharp, Abio J., M.E., Capt., Mechanical Engineer, Harrisonville, Mo. (Harrisonville Machine Works).

Shlaudeman, Frank, B.S., Supt., Decatur Brewing Co., 833 S. Webster St., Decatur. (604 E. Cantrell St.)

Slauson, Howard B., B.S., Lawyer, 613 Rainier St., Seattle, Wash. (78-79 Starr-Boyd Bldg.)

Smith, Charles L., B.L., Capt., Lawyer, 2018 Hawthorne Ave., Minneapolis, Minn. (601-602 Wright Block.)

Spencer, Nelson, B.S., Architect, Beatrice, Neb.

Taft, Florizel A., B.S., Cashier Bank of Hanover, Hanover, Kas.

Todd, James, B.S., Hydraulic Engineer, Batavia.

Turner, Herbert, Capt.

Wadsworth, John G., Capt., Real Estate and Loan Broker, 110 Bancroft St., Council Bluffs, Ia. (103 Pearl St.)

Andrus, Dora A., B.L., Mrs. J. C. Griffith, Ashton.

Avery, Kittie C., B.L., 2736 Decatur St., Omaha, Neb.

Cole, Fronia R., Mrs. W. F. Hall, McLeansboro.

Raley, Arvilla K., Mrs. James Harrison. [Granville.]

Class of 1883.

Abbott, Edward L., B.S., Civil Engineer, 451 Racine Ave., Chicago. (Chicago Edison Co., Edison Bldg.)

*Adams, Charles Francis, died at Chicago, May 20, 1893.

Bogardus, Charles E., B.S., Assayer and Chemist, 1621 Chestnut St., Seattle, Wash. (60 Columbia St.)

Brainard, Clarence, Ass't Engineer Ill. River Improvement, Kampsville.

Craig, William P., Capt., Lawyer, Champaign. (9 Main St.)

Gates, Alphonso S., C.E., Civil and Mining Engineer, Spearfish, S.D.

Going, Judson F., Lawyer, 612 Title and Trust Bldg., Chicago.

Goltra, William F., B.S., Capt., Civil Engineer, and Sec'y to Gen. Manager L.E. & W. Ry. Co., 302 E. New York St., Indianapolis, Ind.

Gray, Nelson A., B.S., Capt., Farmer and Real Estate, Chatsworth, Cal.

Haven, Dwight C., Capt., Lawyer, 408 Richards St., Joliet. (207 Barber's Building.)

Heath, William A., B.L., Cashier Champaign National Bank, Champaign.

Hewes, George C., B.S., Missionary, Reid Christian College, Lucknow, India.

Huey, Joseph Darwin, Rancher, Halleck, Cal.

Kenower, John T., B.S., Supt. and Principal Public Schools, Breckenridge, Mo.,

Lewis, Ralph D.

Little, Henry P. T., Supt. of Schools, Momence.

McCune, Henry L., B.L., Capt., Lawyer, Kansas City, Mo. (608–610 New England Bldg.)

Moore, William D. [Drainage Engineer, Chatham.]

Palmer, Arthur William, Sc.D., Professor of Chemistry Univ. of Ill., 105 N. Elm St., Champaign.

Peirce, Fred Densmore, B.S., Capt., Pharmacist, 479 Leavitt St., Chicago. (583 Ogden Ave.)

Piatt, Silas H., Express Agt., St. Paul, Minn.

Schotchbrook, George P., Grants Pass, Oregon.

Sondericker, William, A.B., Teacher, Woodstock.

Weis, Joseph B., B.S., Analytical and Mfg. Chemist, Franklin, O. (Franklin, O., and 81 Clark St., Chicago.)

*Ashby, Lida M., B.L., Mrs. C. L. Richards, died at Hebron, Neb., September 1, 1888.

Boggs, Harriet M., A.M., Mrs. I. A. Love, Danville.

Colvin, Mary S., Mrs. W. C. Hargis, Bondville.

Fellows, Clara Belle, B.L., Mrs. J. D. Day, Rhinelander, Wis.

Gardner, Jessie, B.L., Music Student, East Norwood, O.

Healey, Grace, B.L., Mrs. C. L. Smith, 2818 Hawthorne Ave., Minneapolis, Minn.

Knowlton, Lizzie Annette, B.L., P.O. Box 729, Lincoln, Neb.

Langley, Mabel Celeste, Mrs. C. L. Slauson, Teacher of Elocution, 613 Rainier St., Seattle, Wash. (Holyoke Block.)

Lewis, Florence C., B.L., Mrs. C. J. Bills, Fairbury, Neb.

Peabody, Kate Fleming, B.L., Mrs. Winthrop Girling, 4200 Berkley Ave., Chicago.

Stewart, Ella M., Teacher Boulevard School, Chicago, 155 Heine St., Chicago.

Wright, Minnie E., B.L., Mrs. J. M. Blackburn, Corsicana, Tex.

Class of 1884.

Abbott, William L., Supt. Central Edison Electric Light and Power Plant, 3213 Beacon St., Chicago. (Edison Bldg.)

Austin, James, Draughtsman, LaCrosse, Wis. (C. B. & N. R. R. Depot.

Babcock, Guy H., Capt.

Barbour, Henry Hugh, B.S., Engineer with Carnegie Steel Co., 923 W. Polk St., Chicago. (Marquette Bldg.)

*Bartholf, Emmett G., A.B., died December 28, 1884.

Bartholf, William J., A.B., Principal VonHumboldt School, 11 Roslyn Place, Chicago. (Rockwell Ave. and Hirsch St.)

Braucher, Arthur Conrad, B.S., Proprietor Machine Shops, 301 Sherman St., Danville. (814 Lincoln St.)

Chapman, Norman Ward, Asst. Engineer St. L. K. & N. W. R. R., (107 Franklin Ave., St. Louis, Mo.)

Eberlien, Frederic W., Physician, Benson.

Herdman, Frank Elmer, M.E., Capt., Engineer Crane Elevator, Winetka. (219 S. Jefferson St., Chicago.)

Hunt, Thomas Forsyth, M.S., Professor of Agriculture Ohio State University, 188 W. 10th Ave., Columbus, O.

Kimball, Edwin Raymond, B.S., Reporter of the United Press Association. (Chicago Press Club.)

Lietze, Frederic Augustus, B.S., Civil Engineer, Carlyle.

Lilly, Charles H., B.S., Dealer in Grain, Flour, and Feed, Seattle, Wash. (West St., north of Madison.)

Lilly, James E., Asst. Counsel Oregon Improvement Co., Seattle, Wash. (Burke Bldg.)

McCluer, George Washington, M.S., Assistant Horticulturist, Agricultural Experiment Station, Univ. of Ill., 303 John St., Champaign.

Montezuma, Charles, B.S., Physician in charge Hospital Indian Industrial School, Carlisle, Penn.

Morgan, George Nathan, B.L., Attorney and Secretary National Electric Construction Co., 7616 Carlin Ave., Windsor Park. (Room 806, 112 Dearborn St., Chicago.)

Parr, Samuel Wilson, M.S., Professor of Applied Chemistry, Univ. of Ill., 918 W. Green St., Urbana.

Philbrick, Solon, Capt., Lawyer, 212 W. Hill St., Champaign. (16 Main St.)

Roberts, Lewis Clark, B.S., Capt., Care of Sacramento Transportation Co., Sacramento, Cal.

Rupp, Andrew Oliver, B.L., Editor and Proprietor of the *Weekly Star*, Lena.

Sizer, Lucius Noyes, B.S., Civil Engineer and Farmer, Fisher.

*Speidel, Ernst, B.S., died at Ravenswood, Oct. 19, 1892.

Stevens, Herbert A., B.S., Real Estate and Loans, 44 S. Ann St., Chicago. (405 Chamber of Commerce Bldg.)

Stratton, Samuel W., B.S., Capt., Associate Professor of Physics, Univ. of Chicago, 5717 Madison Ave., Chicago.

Van Petten, Henry Seward, B.S., Druggist, Evanston.

Vial, Edmund R., B.S., Farmer, Western Springs.

Wills, Jerome Gideon, B.L., Lawyer, Vandalia.

Ayers, Nettie, B.L., Instructor in Bacteriology in National Medical College, 360 Dayton St., Chicago.

Barber, Ella M., M.L., Teacher, Aylmer, Ontario, Canada.

Braucher, Alma E., Medical Student, Hering Medical College, Chicago. (227 Lincoln Ave., Lincoln.)

Campbell, Juniata G., B.L., Mrs. T. F. Hunt, 188 W. 10th Ave., Columbus, Ohio.

*Clark, Lucy J., died at Wichita, Kas., January 9, 1887.

Conkling, Anna J., B.L., Mrs. A. B. Seymour, Waverly, Mass.

Ellis, Lola D., B.L., Mrs. L. D. Forsyth, Gilroy, Cal.

Hall, Lucy A., Mrs. S. W. Parr, 918 W. Green St., Urbana.

Hill, Cora J., Stenographer, 223 29th St., Chicago. (148 Market St., with the John V. Farwell Co.)

Kemball, Georgetta, B.S., Mrs. Harry L. Murray, Greencastle, Ind.

Krause, Josephine, Mrs. Alfred Chalfont, 3047 Easton Ave., St. Louis, Mo.

Sim, Keturah Elizabeth, B.L., Student Univ. of Ill., Urbana.

Smith, Laura B., B.L., Mrs. S. H. Piatt, St. Paul, Minn.

Class of 1885.

Abbott, Alfred N., Capt., Farmer, Union Grove.

Ayers, Judson F., with M., K., & T. R.R., Ft. Scott, Kansas.

Braucher, William Burson, Machinist, 525 Sherman St., Danville. (814 Lincoln St.)

Carter, Harry Leslie.

Cole, Thomas Edward, Physician, LeMars, Iowa.

Colton, Simeon C., B.S., Civil Engineer, with FitzSimons & Connell Co., 424 Chicago Ave., Chicago. (1010 Tacoma Bldg.)

Dunlap, Robert L., Farmer, Savoy.

Ellis, George Huntington, Analytical Chemist and Assayer, 1818 Wesley Ave., Evanston. (103 Metropolitan Block, Chicago.)

Hicks, George Leroy, B.L. [Farmer, Warren.]

Hopper, Charles, Farmer, Bristol.

Kendall, William Finley, B.S., Civil Engineer and Architect, Green Bay, Wis. (6 320 N. Washington St.)

Kent, James Martin, B.S., Electrical Engineer, 1001 Locust St., Kansas City, Mo. (With Emery, Bird, Thayer & Co.)

Lantz, Milo P., B.S., Farmer, Carlock.

Lattin, Judson, B.S., Capt., Draughtsman, 334 61st St., Englewood. (1309 Monadnock Bldg.)

Manns, Albert George, PH.D., Chemist with P. D. Armour & Co., Stock Yards, Chicago.

Marshall, Sherman L., B.L., Dealer in farm machinery, Ipava.

Miller, John A., M.S., PH.D., Prof. of Chemistry and Toxicology in Niagara Univ., 157 Hodge Ave., Buffalo, N.Y. (203 Elliott St.)

Morse, E. Leland, B.S., Capt., Civil Engineer, 4356 Berkley Ave., Chicago. (With Metropolitan Elevated Ry. Co.)

North, Arthur Tappan, Kewanee.

Petty, George Riley, Champaign, Ill.

Rankin, Charles H., Fruit and Poultry Raiser, Falls Creek.

Reynolds, Henry L., B.S., Patent Attorney and Draughtsman, 84 Sullivan Block, Seattle, Wash.

Ronalds, Hugh Louis, B.S. [Artist, Chicago.]

Schleder, Theodore Henry, B.S., Architect and Supt., 1008 W. Polk St., Chicago. (704 Chamber of Commerce.)

Schrader, Alfred Charles, Asst. Engineer of Sanitary District, 3974 Drexel Bvd., Chicago.

Smith, William H.

Stockham, William Henry, B.S., Capt., Manufacturer, Evanston. (49 Dearborn St., Chicago.)

Swern, William Cook, Architect, 1519 W. Adams St., Chicago.

Vial, Frederic Ketchum, B.S., Farmer, LaGrange.

Woodworth, Charles William, M.S., PH.D., Asst. Prof. of Entomology, Agt'l Experiment Station, Univ. of Cal., 2043 Lincoln St., Berkley, Cal.

Wright, John Edward, City Editor *Evening Post*, 2439 Lakewood Ave., Chicago. (164 Washington St.)

Clark, Kate F., B.S., Mrs. W. H. Stockham, Evanston.

Earle, Mary Tracy, B.S., Writer, 42 W. 15th St., New York City.

Jones, Emma T., B.L., Mrs. P. T. Spencer, 32 S. Fourth St., Zanesville, Ohio.

Merboth, Louisa, Mrs. George N. Morgan, 7616 Carlin Ave., Windsor Park.

Owens, Bessie Wolfe, Mrs. J. H. Needham, North Yakima, Wash.

Paullin, L. Estelle, Physician, Albuquerque, N. M. (119 S. Arno St.)

Plank, Bessie Gay, Mrs. L. Thompson, Cherokee, Ia.

Switzer, Charlotte, Principal High School, 608 W. Church St., Champaign.

Weston, Abby, Mrs. William C. Swern, 1519 W. Adams St., Chicago.

Wills, Etta Catherine, Mrs. John W. Schenker, Vandalia.

Wright, Minnie S., Mrs. H. H. Barbour, 923 West Polk St., Chicago.

Wright, Lizzie M., Mrs. Miles W. Canady, 122 Kedzie Ave., Chicago.

Zellar, Josephine M., 315 7th Ave., Peoria.

Class of 1886.

Babcock, William Arthur, B.L. [Ipava.]

Bannister, George Steele, B.S., Architect, 3000 Prairie Ave., Chicago. (23 154 Lake St.)

*Barrett, Dwight Harrison, B.S., died at Baltimore, Md., December, 30, 1888.

Bullard, S. Foster, Civil Engineer, Tacoma, Wash. (516 Chamber of Commerce Bldg.)

Chitty, William Lemon, B.L., Member Board of Pension Appeals, Washington, D.C. (Office Sec'y Interior.)

Cromwell, John C., B.S., Engineer and Draughtsman, Joliet. (Care Illinois Steel Co.)

Davis, James Oliver, B.S. Civil Engineer and Real Estate Dealer, 2716 Austin St., Houston Tex. (310½ Main St.)

Dodds, Joseph Chambers, B.L., Physician Tolono.

Endsley, Leroy, B.S. [Minneapolis, Minn.]

Everhart, Thomas W. B., A.B., Supt. Schools, Virginia.

Fulton, James, B.S.

Garrett, James H., B.S., Manager Chicago Office A. L. Ide & Sons, 2323 N. Robey St., Chicago. (208 Home Insurance Bldg.)

Garvin, John B., B.S., Chemistry Instructor, East Denver High School, Denver Colo.

Harris, James Waldo, B.S., Charlevoix Roller Mills, Charlevoix, Mich.

Hubbard, Henry Thomas, Merchant, Urbana.

*Jacobson, Jacob Stone, died at Denver, Colo., July 15, 1890.

Kamman, Charles Henry, B.L., Head of German Dept. Peoria High School, 900 S. Adams St., Peoria.

Lemme, Emil, Architect, San Francisco, Cal. (48 Flood Bldg.)

Lumley, Clinton Grant, B.S., Physician and Surgeon, 3412 Prairie Ave., Chicago. (3255 State St.)

Morse, Henry Milton, B.S., Draughtsman for Dearborn Foundry Co., 6617 Hope Ave., Chicago. (1525 Dearborn St.)

Olshausen, Walter A.G., 527 Cor. 6th and Scott Sts., Davenport, Ia.

Pence, William David, Asst. Professor of Civil Engineering, Univ. of Ill., 608 E. Green St., Champaign.

Philbrick, Alva, Roadmaster I. C. R. R., 2024 Carondolet St., New Orleans, La.

*Plowman, William Lewis, B.L., died at Shoshone, Wyoming, July 13, 1893.

Roberts, Vestus Bassett, Capt., Civil Engineer and Surveyer, 153 Grove St., Blue Island. (705, 100 Washington St.)

Sargent, Charles Elliotte, Manager Chicago Office Ball & Wood Co., 1174 Palmer St., Chicago. (404 Fort Dearborn Bldg.)

Shlaudeman, Harry, B.S., Sec'y and Treas. Decatur Brewing Co., 942 Lincoln Ave., Decatur. (604 E. Cantrell St.)

Thompson, Luther, Capt., Assistant Roadmaster I. C. R.R., Cherokee, Iowa. (Ill. Cent. R.R.)

Whitmire, Zech Lincoln, M.L., Physician, Urbana.

Wilder, Henry White, A.B., Capt., Sec'y Chicago Bridge and Iron Co. 1319 W. 104th St., Chicago. (105th St. and Hilliard Ave.)

Ayers, Laura Belle, B.L., Teacher, Kenwood School, 4842 Washington Ave., Chicago.

Elder, Nettie, Mrs. Chas. F. Harris, Urbana.

Ermentrout, Anna Mae, B.L., Principal Watseka High School, Watseka.

Fairchild, Rozina P., B.L., Mrs. J. O. Davis, 2716 Austin St., Houston, Tex.

*Huff, Bertie, B.L., Mrs. A. Philbrick, died at Chicago, April 6, 1895.

Jaques, Minnie, B.L., 207 W. Elm St., Urbana.

Parminter, Grace E., B.L., Metamora.

Class of 1887.

Barclay, William, B.S., Splitlog Ave., Kansas City, Kas.

Blake, John Bidwell, B.S., Electrician, Lombard. (239 La-Salle St., Chicago.)

Cantine, Edward Ike, C.E., Capt., Civil Engineer, N.P. R.R., Lopez, Wash. (Tacoma.)

Clark, Percival Lemon, B.S., Physician, 1065 Washington Bvd., Chicago.

Dryer, Erwin, B.S., Electrical Engineer, 26 Ogden Ave., Chicago. (Room 710 N.Y. Life Bldg.)

Fargusson, Mark, C.E., Capt., Civil and Hydraulic Engineer, Southport, N.C.

Fink, Bruce, M.S., Graduate Student Harvard University, Harvard Line St., Cambridge, Mass.

Gilbert, Frank Marion, Building Contractor, 7929 Reynolds Ave., Chicago.

Gill, Rudolph Zerse, Architect, 802 W. Green St., Urbana.

Goldschmidt, Edward William, Special Agent Western Electric Co., 227 S. Clinton St., Chicago.

Goodwin, Philip Albert, B.S., Capt. [Civil Engineer, Albany, Ore.]

Gregory, Grant, B.L., Reporter N.Y. *World*, 438 Gold St., Brooklyn, N.Y. (309 Washington St.)

Henson, Charles Weber, B.S., Printer, 3249 S. Park Ave., Chicago. (350 Dearborn St.)

Johnson, Edward Spencer, Civil Engineer and Contractor, Rock Island. (Flick and Johnson Construction Co.)

Lloyde, Clarence Angier, B.S., Electrician, Champaign.

Long, Frank Brewer, Architect, 304 Bowen Ave., Chicago. (1618 Monadnock Bldg.)

Lyman, Henry Molineaux, B.S., Supt. and Manager Electric Light and Power Co., Canton, O.

Mitchell, Walter Reynolds, B.S., Instructor in Biology in Hyde Park High School, 433 57th St.

Moore, Albert Cutts, B.L., Capt., Clerk, O. R. & N. Co., 209 Sumach St., Walla Walla, Wash.

*Powers, Mark, B.S., died at Evanston, Feb. 28, 1895.

Richards, Albert L., U. S. Supt., Rock Island. (U. S. Engineers' Office.)

Rinaker, John Irving, Jr., Architect, Springfield. (Franklin Building.)

Spear, Grant Warner, B.S., Wood Working Manufactory, 96 Wilder St., Aurora. (122-6 S. Lake St.)

Tatarian, Bedros, B.S., Chemist, Northwestern Fertilizing Co., Stock Yards, Chicago.

Taylor, Horace, Artist, 34 Walton Place, Chicago. (With Chicago *Herald.*)

Waite, Merton Benway, B.S., Capt., Assistant in Division Vegetable Pathology, Washington, D. C. (Department of Agriculture.)

Williams, Herbert Baldwin, B.S., Chemist, Grand Hotel, Pueblo, Colo. (Pueblo Smelting Refinery Co.)

Eisenmayer. Ida, Mascoutah.

Gayman, Angelina, Mrs. N. A. Weston, 701 N. State St., Champaign.

Williamson, Mary Hess, B.L., Mrs. Pearl Elder, Lima, O.

Class of 1888.

Beadle, John Grant, Architect, Galesburg.

Bing, Benjamin, M.S., Merchant, Urbana.

Bowditch, Fred D., B.L., Capt., Principal Schools, Mahomet.

Bryant, William Cullen. [Princeton.]

Bush, Lincoln, B.S., Civil Engineer, 326 Wilson Ave., Ravenswood. (Pittsburg Bridge Co., Owings Building, Chicago.)

Carter, Truman Post, B.S., A.M., Prof. of Natural Sciences, Illinois College, Jacksonville.

Davis, Frank L., Capt., Mosaic Decorator, 44 Bryant Ave., Chicago. (405-406 Temple Court Bldg.)

*Dewey, Ralph Elmore, B.L., died at Evanston, March 7, 1893.

Ellison, Edward E., B.S., Capt., Medical Student, Edwardsville. (Chicago.)

Folger, Adolphus D., Ridge Farm.

Frederick, Grant, B.L., Lawyer, St. Lawrence, S. Dak.

Goldschmidt, Alfred Gustave, B.S., Electrician, 1943½ W. 3d St., Davenport.

Goodell, Nathan Philip, B.L., Attorney, Loda.

Greaves, George, Chemist, Aurora. (New Mexico & Arizona Smelting Co., Ivanhoe, N.M.)

Grindley, Harry Sands, B.S., Assistant in Chemistry, Univ. of Ill., 602 E. Green St., Champaign.

McHugh, George B., B.S., Capt., Lawyer, Urbana.

Myers, George William, M.L., Capt., Assistant Professor of Mathematics, Univ. of Ill., Urbana.

Patton, Jacob Allen, B.S., Capt., Demonstrator of Materia Medica and Instructor in Chemistry, Rush Medical College, 2106 W. Congress St., Chicago.

Pickard, Edward Webster, A. B., Capt., Assistant Editor *Evening Post*, 248 Erie St., Chicago. (164 Washington St.)

Place, Raymond Mason, B.L., Reporter *Chicago Daily News*, 41 Park Ave., Chicago. (*Chicago Daily News.*)

Roberts, Warren Russell, City Bridge Engineer, 343 Leland Ave., Chicago, Station X. (City Hall.)

Samuels, John Huntoon, B.S., Capt., Supt. Moline Plow Co., Moline.

Schaefer, John Victor E., Salesman, 5509 Monroe Ave., Chicago. (Link Belt Machine Co., 39th St., and Stewart Ave.)

Taylor, John W., B.S., Engineer Terminal R.R. Association, 3819 B, Olive Street, St. Louis, Mo.

VanGundy, Charles Philip, Chemist, Baltimore, Md. (B. & O. Ry.)

Barnes, Mary Lena, B.L., 603 E. Springfield Ave., Champaign.

Beach, Etta Loraine, Mrs. John E. Wright, 2439 Lakewood, Ave., Edgewater.

Connet, Ella, M.L., Teacher, Fairbury.

Eldridge, Mary Augusta, B.L., Teacher, Galva.

Jillson, Nellie Wainwright, Teacher of Drawing, 6045 Bond St. E.E., Pittsburg, Penn.

Mathers, Effie Annie, B.S., Mrs. Paul Enlow, Mason City.

McLean, Nellie, B.L., Mrs. C. G. Lumley, 3412 Prairie Ave., Chicago.

McLellan, Mary Clutha, Champaign.

Stoltey, Ida May, Mrs. Geo. R. Petty, Champaign.

Class of 1889.

Bennett, Cleaves, M.L., Medical Student, Chicago. (College of Physicians and Surgeons.)

Bennett, Frederick Marsh, B.L., Student Harvard Univ. Divinity School, Cambridge, Mass.

Bopes, Charles A., B.S., Farmer, Hamlet.

Briggs, Charles Wesley, B.L., Lawyer, 6209 Wentworth Ave., Blue Island.

Carver, Albert, B.S., Capt., Analytical Chemist, Springfield.

Dougherty, Louis S., M.S., Instructor in Biology, High School, Ottawa.

Dunaway, Horace, B.S., Civil Engineer, St. Louis, Mo. (2732 Pine St., U. S. Miss. River Commission.)

Evans, Rolla Watkins, B.S., Vice President of John W. Evans' Sons Co., 311 N. Center St., Bloomington.

Kendall, Harry Frederick, B.L., Editor, Urbana.

Kinder, David R., B.L., Lawyer, Litchfield. (Masonic Block.)

Kinkead, David Russell, 925 E. 9th St., Kansas City, Mo.

Lewis, C. Almon, B.S., Farmer, Joliet.

*Lewis, James Livingston, B.L., Capt., died at Gainesville, Fla., December 20, 1894.

Ligare, Edward Francis, 3836 Calumet Ave., Chicago.

MacConney, Robert Bonner, B.S., Draughtsman, Colo. Iron Works, 921 19th Ave., Denver, Colo.

Moles, Oliver Stephen, M.L., Instructor in Mathematics and English, West Denver High School, Denver, Colo.

Ross, Luther Sherman, M.S., Professor of Biology and Geology, Drake Univ., Des Moines, Ia.

Steele, Phillip, B.S., 5940 Honore St., Chicago.

Weston, Nathan Austin, B.L., Instructor in Mathematics and History, Preparatory School, Univ. of Ill., 701 N. State St., Champaign.

*Weis, Herman Lincoln, died at Tonica, July 25, 1891.

Bronson, Lillie O., Professional Nurse, Urbana.

Coffeen, Amy, B.L., Music Teacher, Champaign.

Church, Blanche Adelaide, B.L., Student, Atlanta. (Art Institute, Chicago.)

Paine, Leanah J., B.L., Long View, Ill.

Sparks, Myrtle Eva, A.M., Instructor in Latin and Literature, Township High School, 820 Clinton St., Ottawa.

Weston, Margaret, B.L., Teacher, 1519 W. Adams St., Chicago. (Bryant School.)

Class of 1890.

Barr, James, B.S., Capt., Manufacturer, 28 W. Washington St., Chicago.

Bawden, Samuel Day, B.S., Capt., Theological Student, Trevor Hall, Rochester, N.Y.

Beardsley, John, B.L., Secretary and Treasurer Maltby & Wallace Co., Champaign.

*Benson, Edward Mills, B.S., died at Ames, Ia., Oct. 8, 1894.

Bowsher, Columbus Austin, Supt. Schools, Champaign.

Camp, Norman Harvey, B.S., Lawyer, 6620 Stewart Ave., Englewood. (94 Washington St., Chicago.)

Clark, Frank Henry, B.S., Capt., Chief Draughtsman C. B. & Q. R. R., Aurora.

Clark, Thomas Arkle, B.L., Instructor in English, Univ. of Ill., 604 W. Green St., Urbana.

Clarkson, James Francis, B.S., Capt., Civil Engineer, Sanitary District of Chicago, 5th floor Rialto Bldg.

Clinton, George Perkins, M.S., Assistant in Botany, Univ. of Ill., 1206 Stoughton St., Urbana.

Cooke, Robert James, B.S., Capt., Civil Engineer C. & W. I. R. R., 822 67th St., Chicago.

Cornelison, Robert Wilson, Sc.D., Manufacturing Chemist, 187 Columbia Heights, Brooklyn, N. Y. (250 Plymouth St.)

Crabbs, Clarence Lincoln, B.S., Capt., Engineer of Location, Metropolitan "L" Ry. Co., Chicago. (1313 Monadnock Block.)

Fisher, John Franklin, B.S., Capt., Draughtsman, 3846 Prairie Ave., Chicago.

Gilliland, William Myers, B.S., Draughtsman, Aurora. (Hercules Iron Works.)

Hanssen, Gustavus Adolphus, Architect, Davenport, Iowa. (53 & 54 Schmidt Bldg.)

Hazelton, Hugh, B.S., Capt., Draughtsman, Forest Glen. (Metropolitan Elevated R. R. Co., 1313 Monadnock Block.)

Keene, Edward S., B.S., Professor of Mechanical Engineering, Fargo, N. Dak. (N. Dakota Agricultural College.)

McCandless, H. Wallace, Electrical Engineer, Schnectady, N.Y. (Care of General Electric Co.)

McKee, Will Een, B.S., Chief Engineer Pabst Heat, Light, and Power Plant, Milwaukee, Wis.

Manny, Walter Isham, Lawyer, Mt. Sterling.

Moore, Byron Llewellyn, B.S., Chemist, Chicago. (Northwestern Fertilizing Co.)

Nesbit, Edwin, B.S. [LaSalle.]

Peoples, U. J. Lincoln, Architect, Pittsburg, Pa. (*Times* Building.)

Proctor, Orla A., B.S., B.L., Editor, 507 Voris St., Peoria. (*The New Era*, 108 N. Adams, St.)

Schaefer, Philemon A., Assistant Chief Engineer, Trinity, Cameron & Western Ry., Georgetown, Tex.

Shamel, Charles H., M.S., LL.B., Lawyer, Taylorville.

Snyder, Christopher Henry, B.S., Civil Engineer, 39 Cortland St., New York. (With Miliken Bros.)

Stevens, Fred Worthley, Chemist, 9434 6th Ave., S. Chicago. (Nat'l. Smelting and Refining Co.)

Terbush, Linsley F., B.L., Chicago *Record*, Chicago.

Tresise, Francis John, C.E., Civil Engineer, 321 Herkimer St., Buffalo, N.Y. (Department of Public Works, 13 City Hall.

*Tscharner, John Baptiste, B.S., died at Waco, Tex., April 22, 1893.

Waterman, Fred Walter, B.S., Draughtsman, Elyria, O. (The Johnson Co., Lorain, O.)

White, James McLaren, B.S., Assistant Professor of Architecture, Univ. of Ill.

Wilber, Frank Dent, B.S., Drayage, Champaign.

Wilkinson, George E., B.S., Capt., Principal High School, Alton. (327 12th St.)

Wilson, Robert Conover, B.S., Physician, 4300 Greenwood Ave., Chicago.

Boyle, Anna Cecelia, B.L., Champaign.

Brumback, Lucia Ray, B.L., Mrs. C. E. Bogardus, 1621 Chestnut St., Seattle, Wash.

Clark, Edith Louisa, Mrs. Jesse Kirkpatrick, Urbana.

Ellars, Jessie, A.M., Assistant Principal, Tuscola.

Kennard, Katharine L., B.L., Champaign.

Class of 1891.

Barclay, Thomas, B.S., Assistant Supt., Chicago, Aurora & Chicago Smelting and Refining Works Co., 380 New York St., Aurora.

Bouton, Charles Sherman, Lawyer, 5420 Ridgewood Court, Chicago. (94 Washington St.)

Boyd, Willard Albion, B. S., Mechanical Engineer, 638 Adams St., Chicago. With S. J. McLeod.

Braucher, Ernest Newton, B.S., Draughtsman, 3803 Vincennes Ave., Chicago. (1618 Monadnock Bldg.)

Bunton, Fred Lyle, B.S. [With Hercules Iron Works, Aurora.]

Chester, Dick Hubert, B.S., Salesman H. R. Worthington Steam Pump Co., 64 S. Pennsylvania St., Indianapolis, Ind.

Chester, John Needles, B.S., Indiana Sales Manager for H. R. Worthington, 64 Pennsylvania St., Indianapolis, Ind.

Clarke, Edwin B., B.S., Capt., Architectural Draughtsman, 440 Dearborn Ave., Chicago. (Metropolitan West Side Elevated R. R. Co.)

Clarke, Frederic Woodruff, B.S., Capt., Architect, 300 State St., Quincy. (45 and 46 Wells Bldg.)

Eidman, Edward Charles, B.S., Editor and Proprietor of *Belleville Daily News*, Belleville.

Eno, Frank Harvey, C.E., Capt., Water Supply and Sewerage Engineer, 6537 Langley Ave., Chicago. (1580 Old Colony Bldg.)

Fischer, Lawrence, 306 E. State St., Jacksonville.

Frahm, Hans, B.L. [Lawyer, La Vita Hotel, Chicago.]

Frederickson, John H., B.S., Civil Engineer, 5215 Washington, Ave., Chicago. (I. C. R. R.)

French, Ransford Morton, B.S., Draughtsman, 194 25th St., Chicago. (Northwestern Terra Cotta Co.)

Gardner, Frank Duane, B.S., Assistant Agriculturist, Agricultural Experiment Station, Univ. of Ill., Champaign.

Gibson, Chas., B.S., Stock Ranch, Richmond, Kas.

Green, Thomas Stephen, B.S., Student, 775 W. Polk St. Chicago. (College of Physicians and Surgeons.)

Harris, Jay Tarven, B. S., Loans and Insurance, Salt Lake City, Utah. (15 West Second South St.)

Harvey, Alfred Ernest, C.E., Capt., Civil Engineer, 6629 Langley Ave., Chicago.

Hay, Walter Morris, B.S., Civil Engineer, Muscatine, Ia.

Hobbs, Glen Moody, B.L., Tutor in Physics Univ. of Chicago, 5717 Madison Ave.

Howarth, Thomas James., A.B., Editor *Chester Tribune*, Chester.

McClure, Ora Deal, B.L., Capt., Draughtsman, Sterling. (Keystone Mfg. Co.)

*McCormick, Wirt, B.L., died at Mahomet, April 9, 1893.

Maue, August, B.L., Teacher in High School, Joliet.

Mitchell, Charles Jacob, B.S., Civil Engineer, 5511 Washington Ave., Chicago. (Fairbanks, Morse & Co.)

Peabody, Lorin William, B.S., Assistant in Testing Laboratory, Univ. of Ill., Urbana.

Powell, John Henderson, Treasurer Swafford Bros. Dry Goods Co., Kansas City, Mo. (607–609 Wyandotte St.)

Richart, Frederick William, B.S., Mechanical and Electrical Engineer, Fredonia. (Carbondale.)

Shamel, Clarence A. M.S., Managing Editor *Orange Judd Farmer*, 253 Dearborn Ave., Chicago. (358 Dearborn St.)

Shattuck, Walter F., Lecturer at Art Institute, and Associate Professor of Mathematics and Architectural Construction, Armour Institute, 59 36th St., Chicago.

Smolt, Frank Oscar, B.S., Capt., Chemist, Aspen, Col.

Terrill, Joseph Samuel, M.S., Assistant in Entomology and Botany, Lexington, Ky.

Vail, Charles Davis, B.S., Capt. [230 W. 12th Ave., Denver, Colo.]

Wallace, Ross Strawn, B.S., Capt., Engineer, Pontiac. [Ill. State Reformatory.]

Young, Chas. Bailey, B.S., Architect, 320 New York St., Aurora. (C., B., & Q. R.R.)

Beach, Laura Mae, Mrs. N. C. Wright, 124 S. Kedzie Ave., Chicago.

Broaddus, Alice Virginia, Teacher of Physical Training and Elocution, Sherman Institute, Sherman, Tex.

Butterfield, Helen Eliza, M.L., Assistant in English, Univ. of Ill., 308 W. Church St., Champaign.

Carson, Anne, B.L., Urbana.

Darby, Nellie Margaret, B.L., Teacher, North Platte, Neb.

Heller, Opal Beatrice, B.L., Teacher, Urbana.

Jones, Isabel Eliza, Champaign.

Jones, Mabel, B.L., Teacher, Champaign.

Myers, Clara, B.L., Mrs. A. E. Harvey, 6629 Langley Ave., Chicago.

Paine, Sarah Mariena, Teacher, Long View.

Shattuck, Anna Fletcher, B.L., Mrs. A. W. Palmer, Champaign.

Siebert, Emma Effie, B.S., Student Univ. of Ill., Champaign.

Class of 1892.

Barber, William Davis, B.S., Civil Engineer, 375 State St. (1119 Rookery Bldg.)

Barker, John King, B.S., Civil Engineer, Three Rivers, Mass.

Beckwith, Frank, B.S., Civil Engineer, with C. B. &. Q. R. R., Adams and Franklin Sts., Chicago.

Burrows, Park Tunis, B.S., Capt., Architect, Davenport, Ia. (Room 41, Mitchell & Lynde Bldg., Rock Island.)

Carnahan, Franklin Gregory, A.B., with Union Water Supply Co., Champaign.

Crissey, John Waterbury, B.S., Civil Engineer, 1313 Monadnock Bldg., Chicago.

Cross, Charles William, B.S., Draughtsman, Indianapolis, Ind. (Brown-Ketchum Iron Works.)

Forbes, Robert Humphrey, B.S., Professor of Chemistry and Chemist of Experiment Station, Univ. of Arizona, Tucson, Arizona.

Foster, Winslow Howard, B.S., Draughtsman, 316 N. Harvey Ave., Oak Park. (Care M. Morava, 84 Adams St., Chicago.)

Foster, Zebulon, B.S., Civil Engineer, 330 LaSalle Ave., Chicago. (I. C. R. R. Depot.)

Funston, Edmund Bailey, B.S., Teacher of Manual Training, 922 S. Union Ave., Pueblo, Colo.

Gates, Andrew Wallace, B.S., City Engineer and Supt. Public Works, Muscatine, Ia.

Gulick, Edward Everett, B.L., Theological Student, Upper Alton.

Gulick, Joseph Piper, B.L., Teacher, Savoy.

Gunn, Charles Alexander, B.S., Assistant in Architecture, Univ. of Ill., 101 W. Springfield Ave., Champaign.

Hall, Fred Augustus, B.S., Druggist, Tonica.

Hart, Ralph Warner, B.S., 1618 Monadnock Bldg., Chicago.

Harvey, Walter Clarence, B.S., Architect, 6324 Stony Island Ave., Chicago.

Herrick, Lott Russell, B.L., Lawyer, Farmer City.

Kiler, Charles Albert, Furniture, Mittendorf & Kiler, Champaign.

McLane, Cyrus Daniel, B.S., Instructor in Architecture, University of Ill., 307 N. Prairie St., Champaign.

Martin, William Alexander, B.S., Assistant Treasurer, Chicago Interior Decorating Co., 1127 Millard Ave., Chicago. (149-150 Michigan Ave.)

Mather, Roy Allen, B.S., Capt., Draughtsman, Naperville. (1313 Monadnock Block, Chicago.)

Miller, William George, B.S., Telautograph Expert, 269 E. Ontario St., Chicago. (Gray Nat'l Telautograph Co. Highland Park.)

Morgan, John Barb, Jr., Lawyer, Windsor Park. (806–112 Dearborn St., Chicago.

Page, John William.

Piatt, Herman S. A.M., Instructor in Romance Languages, Univ. of Ill., Urbana.

Plank, Ulysses Samuel Grant, B.S., Secretary Y.M.C.A., Taylor, Tex.

Pullen, Rome B, B.L., Lawyer, 908 Y.M.C.A. Bldg., Chicago.

Scheidenhelm, Edward Louis, B.S., Civil Engineer, 58 S. Oakley Ave. (Care Purdy & Henderson, Rookery Bldg.)

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Wright, Royal, B.L., Lawyer, Urbana.

Barber, Alice May, M.S., Assistant in Botany, Univ. of Ill., 1007 Green St., Urbana.

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Boggs, Cassandra Armstrong, B.L., Teacher, Urbana.

Hill, Agnes Gale, A.B., Foreign Secretary Woman's Christian Association, Madras, India.

Maxwell, Anne M., B.L., Champaign.

Class of 1893.

Andrews, Hubert Franklin, B.S., Instructor in Biology and Geology, High School, Salt Lake City, Utah.

Arbiter, George John, B.L., Law Student, Michigan University, Plainfield.

Bacon, Harlow, B.S., Civil Engineer, South McAlester, I.T. (C., O., & G. Ry. Co.)

Barrett, Edward Ernest, B.S., U. S. Surveyor, 921 22nd St., Rock Island. (U. S. Engineer's Office.)

Bartlett, Henry Emmett, B.S., County Supt. Schools, Mt. Sterling.

Behrensmeyer, George Philip, Architect, Quincy.

Blakesley, George Webster, B.S., Draughtsman, Rock Island. (Rock Island Stove Co.)

Brown, Frank Manear, B.S., I. C. R. R. Freight Office, Champaign.

Carpenter, Harvey Irving, B.L., Music Teacher, 610 E. Clark St., Champaign.

Carr, Robert Franklin, Chemist, 136 Prairie Ave., Austin. (31-33 Rialto Bldg., Chicago.)

Carter, Charles Willard, M.L., Medical Student, College Physicians & Surgeons, Chicago.

Chambers, William Rock, Law Student, 370 E. Ohio St., Chicago. (711 Masonic Temple.)

Chester, Oscar Paul, B.S., Medical Student, Northwestern Univ., Chicago.

Coffeen, Fred Goldsmith, B.S., Student, Univ. of Ill., 510 E. White St., Champaign.

Cook, James W, B.S., Mechanical Engineer, Rock Island.

Cornell, William Henry, B.S., Mechanical Engineer, Grant Park. (With Blakeslee Mfg. Co., DuQuoin.)

Craig, Edward Chilton, Capt., Law Student, Mattoon.

Danley, Willis Wilson, B.S. [Civil Engineer, Hennepin.]

Earl, Mark Alden, Civil Engineer, with G. W. Sturtevant, 804 Chamber of Commerce, Chicago.

Fraser, Wilber John, B.S., with Agricultural Experiment Station, Univ. of Ill., 307 S. Wright St., Champaign.

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THE UNIVERSITY CALENDAR.

1895-96.

FALL TERM—1895.

Sept. 5, Thursday.	Entrance examinations begin.
Sept. 9, 10, Monday and Tuesday.	Registration Days.
Sept. 11. Wednesday.	Instruction begins.
Nov. 4, Monday.	Latest date for announcing Subjects of Theses for Baccalaureate Degrees.
Nov. 28, Thursday.	Thanksgiving Recess.
Dec. 2, Monday.	Instruction resumed.
Dec. 18, Wednesday.	Term Examinations begin.
Dec. 20, Friday.	Term ends.

WINTER TERM—1896.

Jan. 6, Monday.	Entrance Examinations.
Jan. 6, 7, Monday and Tuesday.	Registration Days.
Jan. 8, Wednesday.	Instruction begins.
March 23, Monday.	Term Examinations begin.
March 25, Wednesday.	Term ends.

SPRING TERM—1896.

March 31 and April 1, Tuesday and Wednesday.	Registration Days.
April 2, Thursday.	Instruction begins.

April 25, Saturday.	Latest day for presenting Commencement Theses and Orations.
May 25, Monday.	Hazleton Prize Drill.
May 26, Tuesday.	Competitive Drill.
May 28, Thursday.	Senior Examinations begin.
June 3, Wednesday.	Term Examinations begin.
June 7, Sunday.	Baccalaureate Address.
June 8, Monday.	Class Day.
June 9, Tuesday.	Alumni Day.
June 10, Wednesday.	Twenty-fifth Annual Commencement.

FALL TERM—1896.

Sept. 3, Thursday.	Entrance Examinations begin.
Sept. 7, 8, Monday and Tuesday.	Registration Days.
Sept. 9, Wednesday.	Instruction begins.
Nov. 2, Monday.	Latest date for announcing Subjects of Theses for Baccalaureate Degrees.
Nov. 26, Thursday.	Thanksgiving Recess.
Nov. 30, Monday.	Instruction resumed.
Dec. 16, Wednesday.	Term Examinations begin.
Dec. 18, Friday.	Term ends.

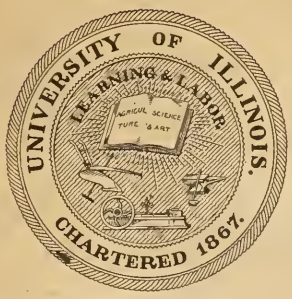
INDEX.

Accredited Schools.....187
Scholarships for.....179
Admission.....182
Agricultural Experiment Station.4, 10
Agriculture.....90
Courses offered.....95
Winter School.....94
Alumni, list of.....231
Anglo Saxon, see English, Course 8.
Anthropology.....97
Architectural Engineering.....43
Course required for a degree.....44
Architecture.....41
Course required for a degree.....42
Courses offered.....97
In Graduate School.....168
Art and Design.....29
Courses offered.....105
Art Gallery.....17
Astronomy.....70
Courses offered.....107, 118
For admission.....186
See Mathematics and Astronomy.
Bacteriology, see Botany, courses offered.
Biology, general courses offered...109
Board of Trustees.....3
Botany.....80
Courses offered.....109
For admission.....186
Buildings and Grounds.....15
Calendar.....267
Chemical Group.....59
Requirements for a degree..62, 64, 68
Chemistry.....59
Courses offered.....111
For admission.....186
Chicago Club Loan Fund.....180, 230
Choice of Studies.....192
Civil Engineering.....45
Course required for a degree.....46
Courses offered.....116
In Graduate School.....168
College of Agriculture.....89
Admission.....183
Requirements for a degree.....91
College of Engineering.....38
Admission.....183
College of Literature and Arts.....23
Requirements for a degree.....25
Admission.....182
College of Science.....57
Admission.....183
Commissions.....193
County Superintendents' Certificates.....200
Degrees.....195
Descriptive Geometry.....120
Drawing, Free Hand, for adm's'n..187
See Art and Design.
Drawing, General Engineering, courses.....119
Economics.....30, 87
Courses offered.....120
In Graduate School.....171
Electrical Engineering.....47
Course required for a degree.....48
Courses offered.....123
In Graduate School.....170
English.....30
Courses offered.....125
For admission.....184
Entomology, see Zoology, courses offered.
Examinations, entrance.....182
Program.....187
Term.....194
Expenses.....196
Faculty.....5
Fellowships.....180
Forestry, see Horticulture, courses offered.
Free Hand Drawing, for admission.187
See Art and Design.
French, for admission.....185
See Romance Languages.
Geology.....81
Courses offered.....126
General List of Subjects.....95
German.....30
Courses offered.....128
For admission.....185
Graduate School.....167
Greek.....31
Courses offered.....129
For admission.....185
History.....31
Courses offered.....131
For admission.....183
Honorary Scholarships.....178
Horticulture, courses offered.....132
See College of Agriculture.
Hydraulics.....145
In Graduate School.....169
Hygiene, see Physical Culture.
Icelandic, see English, course 13.
Italian, see Romance Languages.
Laboratories.....18
Latin.....32
Courses offered.....133
For admission.....185
Lettering.....120
Library.....17
Materia Medica, courses offered....134
Mathematical Group.....70
Requirements for a degree.....72
Mathematics.....33, 70
Courses offered.....135
For admission.....186
Mathematics and Astronomy.....74

Mathematics and Physics.. 74
Mechanical Engineering..... 50
Course required for degree.. 52
Courses offered..... 139
In Graduate School 170
Mechanics, Theoretical and Appl'd. 56
Courses offered..... 143
In Graduate School 171
Medicine, courses preparatory to study of 79
Meteorology, course offered..... 145
Military Science..... 192
Courses offered..... 145
Scholarships.....180
Mineralogy.. 81
Courses offered 146
Municipal and Sanitary Eng'g..... 53
Course required for a degree..... 53
Courses offered. 147
In Graduate School 168
Museum of Industrial Art. 21
Museums and Collections..... 19
Music..... 148
Courses offered..... 148
Fees..... 197
Natural Science Group..... 75
Requirements for a degree 76
Special courses preliminary to Medicine..... 79
Officers of the Battalion.....230
Oral Rhetoric and Oratory, courses offered..... 160
Pedagogy..... 34
Courses offered 149
Pharmacy..... 67
Courses offered.....151
Two years' course..... .. 69
Philosophical Group..... 85
Requirements for a degree.... ... 87
Philosophy..... ...34, 88
Courses offered.....152
Physical Training, for Men. 194
For Women, courses offered.....154
Physics..... ... 54
Courses offered. 155
For admission 186
See Mathematics and Physics
Physiology..... ... 82
Courses offered 156
For admission 186
Preparatory School..... 199
Prizes..... ....178, 229
Psychology..... ....35, 88
Courses offered. 157
Registration... 191
Regulations and Administration...182
Rhetoric..... 35
Courses offered... 159
Romance Languages..... 36
Courses offered..... 160
Scholarships, Accredited High School..... ...179, 229
Honorary..... .....178, 229
Military..... 180
Societies . .. .181
Sociology, see Economics.
Spanish, see Romance Languages.
State Laboratory of Natural History..... 10
Students, list of 200
Summary of 228
Summer School,..... 173
Theoretical and Applied Mechanics, see Mechanics, etc.
University of Illinois, History.. 11
Veterinary Science, courses offered.162
See College of Agriculture
Winter School of Agriculture... ... 94
Zoology..... 84
Courses offered..... 162
For admission..... 187

UNIVERSITY OF ILLINOIS

1894-95



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